The Brain Sciences and Criminal Law Norms

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FORWARD: THE BRAIN SCIENCES AND CRIMINAL LAW NORMS

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ψ = fΦ

Few would dispute the proposition that social cognition, emotion and behavior, ψ, emanate from the brain, Φ.

INTRODUCTION

At the end of the day, every thoughtful researcher in every discipline seeks to answer the same basic ontological question: “Who are we?” Practitioners within these many disciplines address this question in their own unique ways, employing the rhetoric and idioms, the agenda and metrics that express and define their respective domains. That is given. Neuroscience and its diverse researchers work at the frontier of knowledge about our brains, the final material cause of all of our endeavors. They fully share the commitment to this fundamental question. From the perspective of the neurosciences, the answer to this primary question about self-knowledge, though certainly not now and perhaps never fully understood, is nonetheless more widely understood and the information more justifiably warranted now than at any time in human history. We know at least this with absolute certainty: Everything, everything we perceive and know and feel emanates from the brain.¹ Moch of the new information affirms our sense of self. But some do not, and we should therefore take seriously the observation of Robert Sapolsky: Many of the findings from neuroscience “must
challenge our sense of self."

In this paper, I report on the research that supports the assertion that we are obliged to take cognizance of this new knowledge of ourselves uncovered by neuroscientists. The major claim is not that we have discovered the mystery of the naturalistic fallacy; neuroscience is mostly a descriptive endeavor, after all. Rather, the claim is that we should review these findings and ask whether they belong in discussion about the sources that inform our normative discussions about substantive criminal law. Of course, many observers think that some of this new learning does belong and that bringing this data into the discussion will require us to take into account more fully than we do now the limitations that many among us are condemned to suffer. Compassion in criminal law is and will always be a good for us as a polity.

What neuroscience tells us in broad terms is that measurements taken by the best available technology we currently possess on virtually every capacity and condition that our genotype is capable of expressing provide many useful suggestions about this basic question. From this perspective – broadly described to include neuroscience, behavioral genetics, evolutionary and cognitive psychology – many traits are graphically distributed on a standard as a “bell-shaped curve.” As a metaphor, the standard distribution graph is often and justly associated with racial animus and is rightly derided. We have tended to politicize the questions we ask of our genotypes and so the derision is often well-earned.

But misuse in the past is obviously not always predictive of same. The standard distribution, when applied to the human genome, is shorthand for the distribution of many varied mechanisms and processes that generate the many midpoints along continua that define our human capacities, especially as an explanation for anger and heinous mala in se crimes. Differences in functions as widely varying as nano-quantities of neurotransmitters and hormones that flow through our brains and blood streams, for example, seem sometimes to occur as a function of post-birth exposure to unreasonably harsh conditions. Some among us will, therefore, necessarily fail to meet our social norms. Vitally, though, we have the power to effect some shifts in the distributive midpoints of our various capacities from a less toward a more compassionate and progressive direction, one that could raise for the better the conditions if not the capacities of the least well off among us, along with

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2Robert M. Sapolsky, The Prefrontal Cortex and the Criminal Justice System, 359 Phil. Trans. R. Soc’y. London 1787, 1787 (2004) (emphasis added) (arguing that damage to the prefrontal cortex can produce individuals who know the difference between right and wrong and are, nonetheless, “organically incapable of appropriately regulating their behavior”).

3But see William D. Casebeer, Natural Ethical Facts: Evolution, Connectionism, and Moral Cognition Ch. 2 (MIT 2003).

everyone else.\textsuperscript{5}

If this assessment is even approximately accurate, then we should think seriously about Sapolsky’s observation and, when appropriate, propose challenging ideas in response to it. Individuals who support the findings from the various disciplines that constitute “neuroscience” seem to bear a burden of expression: one committed to refocusing public discourse. To that end, at least four basic questions merit our consideration. First, and the principal subject of this article, is what do we know about the relationship between unwelcomed actions and genetic/neurobiological deficiencies? Second, if some among us are condemned to suffer neurobiological and behavioral deficits, are they also susceptible to socially desirable rehabilitative interventions? And, if so, what are they and why do we refuse to adopt them? And if not, then what? Third, what are the sources of our sometimes conflicting evolutionary urges? On the one hand, we know that some who suffer neurobiological deficits that conduce to crime do commit crimes and, for that, they may not bear (full) responsibility; on the other, and equally urgent, we have adaptive needs to constrain them and, sometimes, to forgive. Finally, what adjustments can we make to change the norms we use in our criminal law to reflect the new knowledge gained in the brain sciences and to effect positive changes in human behavior? I hope to address these questions in some detail here.\textsuperscript{6}

This work hopes to develop a theme of compassionate progressivism in the context of neuroscience.\textsuperscript{7} It maintains that the brain sciences have added and will continue to add new and useful sources of explanation for human behavior. Thus, the work discusses the model of human behavior that our law now embraces, according to which (gross and verifiable psychopathology, excepted\textsuperscript{8}) we all possess the capacity to make responsible choices virtually all the time. This

\textsuperscript{5}If this sounds like an effort to combine Rawlsian thinking with contemporary neuroscience, it does so because it is such an effort. See, e.g., Theodore Y. Blumoff, \textit{An Essay on Liberalism and Public Theology}, 14 J. LAW & RELIG. 229 (Winter 1999/2000).


\textsuperscript{7}See Joshua Greene and Jonathan Cohen, \textit{For the Law, Neuroscience Changes Nothing and Everything}, 359 TRANS. SOC. LOND. 1775 (2004). I am attempting to add to their work some Rawlsian notions about a just society.

\textsuperscript{8}Under the Model Penal Code, all questions relevant to the defenses of insanity, duress and others all that address issues of extraordinary individual vulnerability – to cognitive failure, to complete volitional failure, to fear and (at least historically) perceptions about the (mostly male) individual’s extraordinary vulnerability to certain settings – may be taken into account only under the standard of gross and verifiable. As to general questions of volition, however, the Code Drafter’s illogically and with some neurobiological naivet\`e, declared “an unwillingness to vary legal norms with the individual’s
conventional wisdom reflects a brilliant illustration of genotype and historical experiences that shape our intuitions and work together to constrain ourselves in the interest of long term species survival. But it is incomplete. As a liberal society committed generally to a progressive view of history, ours must be prepared to make necessary adjustments in the interest of a more compassionate way of life. This work traces findings from the brain sciences, constrained by the metrics of the various disciplines that fall under that umbrella and fittingly applied to criminal law. These findings indicate that we have the potential for bringing more compassion to our substantive criminal law, and thus are capable of producing a marginally safer society: one that yields to a fuller understanding of both who we are and what we are capable of achieving.

Toward those ends, the work is divided into five sections. Section I clears some underbrush by presenting a sketch of the prevailing dualist model of human behavior that still supports Anglo-American criminal law. The sketch situates the issues raised here within the jurisprudence of Anglo-American criminal law, and, in particular, our understanding of the issues of choice and character. I will suggest that this focus on choice versus character reflects a false dichotomy; our decisions always reflects both and neither is invulnerable to the vicissitudes of genetic expression.

With that as a benchmark, Section II begins by setting out some of the major assumptions of the neuroscience, behavioral genetics, and evolutionary psychology that inform this work. It then provides a brief synthesis of the selectional model of human behavior that is, in one form or another, broadly embraced by brain science researchers. A review of some of this exciting research generates the incontestable conclusion that each individual’s unique environment (nurture) interacts with and acts upon the individual’s phenotype (nature) in an ongoing process that produces each unique individual. The environment, coupled with individual neurobiological differences, can bring about negative, unwelcome behaviors, but it also produces positive benefits for all individuals. And we have known this all along.

Next, Section III suggests both the limits and promises of current findings in neuroscience. Although neuroscience and the tools of brain imaging are sufficiently well developed to evidence our neurobiology in remarkable detail unimaginable until a decade or two ago (roughly the size of a grain of rice), they are not yet sufficiently developed to be very useful in the guilt phase of most criminal trials. Neuroimaging may and sometimes does serve to mitigate punishment in the sentencing phase of capital crimes, but in that setting the evidence is always double-edged. Imaging techniques are by their very nature, however, sufficiently well developed today to effect some global substantive and procedural changes in our norms, including those related to burdens of proof and the definition of capacity to meet the standards they prescribe, absent a disability that is both gross and verifiable.” Model Penal Code, § 2.09 comment 2 (“Stark, tangible factors that differentiate the actor from another, like his [or her] size, strength, age, or health, would be considered in making the exculpatory judgment.”).

Imaging is also used fairly routinely to illustrate brain damage in civil litigation. See, e.g., O. Carter Snead, Neuroimaging and the “Complexity” of Capital Punishment, 82 N. Y. U. L. REV. 1265, 1291-93 (2007) (surveying cases that have admitted imaging in civil litigation).
competency, and so the availability of some defenses.

Section IV addresses several objections including one holding that because our concept of free will is a social construction, nothing neuroscience shows us will undermine our belief in choice; a second is that the goals of the rehabilitationists are at war with one another, and, finally, it addresses the contention that a commitment to bringing developments from the brain science into criminal law requires us to embrace determinism or mechanism. None of these objections is insurmountable.

In the final section, Section V, I will present a normative case, arguing that overcoming important primary barriers to achieving more compassionate ends in substantive criminal law is within our reach, notwithstanding the damage some among us have suffered. Overcoming such barriers is largely a matter of bringing a major long term commitment to a public policy in synchrony with a thickly described, publicly-shared commitment to a secular natural theology. And insofar as we reduce recidivism, we will be better off in the long run.

I. THE CARTESIAN MODEL & CRIMINAL LAW

I have just convinced myself that nothing whatsoever existed in the world, that there was no sky, no earth, no minds, and no bodies; have I not thereby convinced myself that I did not exist? Not at all; without doubt I existed if I was convinced or even if I thought anything. . . . I am, I exist, is necessarily true every time that I pronounce it or conceive it in my mind.10

A. Some Background.

Most of us are familiar with at least a part of the Descartes’ quote. In his philosophy, Descartes’ view of humankind rested in part on a kind of disembodied mind. Following the Platonic tradition, he dispatched the body to the periphery when it came to accounting for what makes a human life praiseworthy. “And we also find so many other things in the mind itself which can contribute to the clarification of its nature, that those which depend on the body . . . hardly deserve to be taken into account.”11

The Cartesian approach to self-knowledge has held sway for over three centuries. At least since William James first published THE PRINCIPLES OF PSYCHOLOGY in 1890, however, researchers have understood (or had access to information indicating) that the traditional Cartesian view of the


11 Id. at 32. For a view of Descartes’ sense of the relationship between body and mind, see, e.g., Descartes and the Pineal Gland, STAN. ENCYC. PHILOS., available online at http://plato.stanford.edu/entries/pineal-gland/#2.
Descartes’ theory, in brief, was that the mind (or the soul) performed like the pilot of a tug, controlling the steerage through hostile shoals. The Cartesian theory lent itself easily to the intuition shared by adults and children alike, that within our skulls resides a central processing mechanism with the power to preview our relations with and thoughts about the world – our intentions – and then push the mental buttons (or, later, run a computer program) that produces the appropriate unified (“bound”) vision of the world and our response to it. Our intentions, merely kept alive by the body, direct all interactions between the individual and the world at large.

Our bodies thus exist to house the mind, as Descartes’ Second Meditation makes clear, and it is our bejeweled mind alone that controls our choices. Literally, of course, there is no such controlling mechanism, and if there were, we would then be required to discover who controlled the levers of that mechanism, and who controlled the controller’s levers and so on ad infinitum. Where is this Homunculus, this little man who operates the Cartesian theatre? There is none. There are multiple mechanisms coordinated by an incredibly rich, magnificent and beautiful history of evolutionary adaptation and change that takes in and interacts with the environment.

But, first, enter Locke. Although Locke rejected Descartes’ intuition-driven metaphysics in favor of an empiricism premised on observation and learning, his work nonetheless fed the Cartesian misunderstanding of the incorporeal mind through the tradition of tabula rasa, or the mind as “blank slate,” a view which holds that humans are born devoid of ideas; ideas and ideation come only with

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13 Stuart Hampshire, MORALITY AND CONFLICT 46 (Harvard 1983) (describing Spinoza’s naturalistic ethics as, in part, a rejection of “Descartes’ theory of the soul as being like a pilot in a ship”).


15 Even those who work within the heavy jargon of neuroscience find analogies, similes and metaphors unavoidable. I will try to keep the technical details to a minimum, but beg the readers indulgence concerning the use of metaphors. When I describe the problem of homunculus as “a little man” in the brain, therefore, I ask the reader to accommodate the use of visual images that only partially illustrate the point in text.

16 See, e.g. Damasio, DESCARTES’ ERROR, supra note # – at 99; Edelman, BRILLIANT AIR, supra note # –, at 79-81; Searle, “MIND, LANGUAGE, AND SOCIETY,” supra note # –, at 81; Michael R. Rose, DARWIN’S SPECTRE: EVOLUTIONARY BIOLOGY IN THE MODERN WORLD (Princeton 1998).

17 The phrase is from Daniel Dennett’s CONSCIOUSNESS EXPLAINED 107 (Little Brown 1991).
experience. Committed to Newtonian physics and its new way of sensing the world, and disdainful of the Cartesian notion of “innateness,” (a view seen as inimical to the mathematical world introduced by Newton and his contemporaries), Locke rejected the idea of special hands-on divine creation and moved to a contrary view, according to which ideas work through primary and secondary human qualities that then imprint themselves on human brains. As an approach to social epistemology, Locke’s views served then contemporaneous intellectual and political philosophy which denied “any differences we see among races, ethnic groups, sexes and individuals;” all such differences could be accounted for based on differences in experience. Locke was at least half right, which is not bad by most standards. Unfortunately, the important insight that individuals may possess different capacities that can be accounted for only biologically was, at least in some instances, anathema and, for the many historical reasons, remains so in contemporary culture. We are all viewed as capable of being conditioned by experience and thus of controlling our destinies. This is not, of course, entirely the case.

The Behaviorists of the first half of the twentieth century continued the trend toward a belief in universal “conditionability.” “Give me a dozen healthy infants,” John B. Watson declared, “and

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19 See Harry Prosch, The Genesis of Twentieth Century Philosophy 84-8 (Doubleday 1964) (explaining the Lockean distinction between those qualities that exist physically at the atomic level and those that exist as perceptions of such matters in human minds).

20 Pinker, supra note # –, at 6. Not surprisingly, Locke too had a political agenda, but it was quite different than ours today. Locke’s theory undermined the claims of hereditary monarchies, who made claims to God-given superiority. Id. This tradition was carried forward in the twentieth century, and for equally virtuous reasons of political philosophy, by Franz Boas. For a highly readable recapitulation of Boas’ career, see Claudia Roth Pierpont, The Measure of America: How a Rebel Anthropologist Waged War on Racism, The New Yorker, March 8, 2004, at 48.

21 One has only to recall the outrage engendered by suggestions that African-Americans and Caucasians may differ in athletic or intellectual ability based on some native qualities, or that women may not be as well suited to math and science as males. See e.g., Marcella Bombardieri, Harvard Women’s Group Rips Summers, The Boston Globe, January 19, 2005, at http://www.boston.com/news/education/higher/articles/2005/01/19/harvard_womens_group_rips_summers/. These subjects are taboo. The response to Richard J. Herrnstein & Charles Murray, The Bell Curve: Intelligence and Class Structure in America (Free Press 1994), is characteristic: Their suggestion that there might be inherent differences in intelligence was greeted not so much as bad science, which seems to be the case, see, e.g., Oliver R. Goodenough, Biology, Behavior, and Criminal Law: Seeking a Responsible Approach to An Inevitable Interchange, 22 VT. L. REV. 263, 271-72, 278-79 (1997), but as racist.

22 See, e.g., Model Penal Code § 2.01 cmt. 1 at 215 (Official Draft and Revised Comments, 1985) (defining “voluntary” in a way that refuses to “inject into the criminal law questions about determinism and free will”).
my own specified world to bring them up in and I’ll guarantee to . . . train him to become any type of specialist I might select, doctor, lawyer . . . and yes, even beggar-man.” For the behaviorist, all mental activities are reducible to behaviors per se or to dispositions to certain behaviors. To display trait α is to engage in α or to be disposed to α-ing. Thus, to exhibit sadness or anger or happiness, on this view, is to engage in sad or angry or happy behavior or a possess an ocurrent disposition to same,24 which can be modified or conditioned by the use of appropriate behavioral techniques. Latter day functionalists do not deny the existence of either mental operations or the mind; they simply claim that the mind is indistinguishable from any other information processing machines. As John Searle notes, mental states from this perspective actualize a certain kind of causal relationship: that is to say, a mental state is “any state of a physical system . . . [that] stands in the right causal relations to input stimuli, to other functional states of the system, and to output behavior.”25 Building on a behaviorist foundation, contemporary functionalists describe meaning as what comes of a string of symbols that reflects various sensory inputs that are transformed into output according to a formal system which operates without regard to content.26 On this telling, to be angry is to be in a state that is caused by a particular sort of stimulation to nerve endings (of one sort or another) that energize feelings of anger. Manipulate the symbols and you manipulate the person’s conduct. Life is reduced to algorithmic processes that produce certain predictable corresponding emotions.

The main point here is that the model of human behavior that drives much of contemporary law and public policy is still informed by a view of human behavior that denies substantial differences in cognitive and volitional abilities based on human biology; the standard distribution of capacities demands unequal capacities. As noted, in the legal domain, everyone is deemed capable of making appropriate decisions in the absence of gross and verifiable psychopathology. Unarticulated in this view are assumptions about conditionability, character, and choice. All appearances to the contrary


25Id.

26Edelman, Bright Air, supra note # –, at 222-23.
notwithstanding, killers like Jeffrey Dahmer, Andrea Yates, Robert Alton Harris and the like are deemed competent and prima facie viewed as “sane” because they can effect a practical syllogism and “know” (at some points in time) that killing is wrong. Thus, they can move from an occurrent desire to belief (about how to effectuate that desire) to an action that effects the desire. For that reason, we reach the legal conclusion that, but for their evil character, they could have chosen otherwise.

B. Choice and Character – A False Dualism

This section begins by describing the Kantian groundwork for a theory of choice in the law, then considers the choosing system described by H. L. A. Hart. Thereafter, it discusses character theory, a lineage that begins with Aristotle and runs through Hume, and posits that we choose our characters and, therefore, we choose to be criminals. Both positions demonstrate the fallacy of dualism, assuming that a clear division exists where none does.

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27 Dahmer was convicted of multiple murders and cannibalism before he was ultimately killed by the prison population in Wisconsin’s most secure prison. He was found to be sane. See, e.g., Insanity Defense By Dahmer Fails, N. Y. TIMES, Feb. 16 1992, sec. 1, part 1; col.6; Report Documents Dahmer’s Cannibalism, U.P.I., Aug., 4, 1991; online at www.geocities.com/donnysmith.geo/dahmer.html; www.arminm.com/jeffrey_dahmer.htm.

28 Andrea Yates is the Houston mother who drowned her five young children with the hope that doing so would provide for their salvation. See Transcript of Andrea Yates’ Confession, Feb. 21, 2002 at www.chron.com/cs/CDA/story.hts/special/drownings. On her background see A Mother's Madness - Andrea Yates, at www.courttv.com/onair/shows/mugshots/episodes/yates.html. In her first trial, in which tainted evidence of sanity was admitted, she was deemed sane and convicted. She was subsequently found not guilty by reason of insanity. See, e.g., Andrea Yates Found Not Guilty By Reason Of Insanity, CBS NEWS, July 26, 2006, at http://www.cbsnews.com/stories/2006/07/26/national/main1837248.shtml. But those facts raise a different issue.

29 Harris committed senseless brutal murders of two teenagers who offered him a ride. On Harris’s life, see Miles Corwin, Icy Killer’s Life Steeped in Violence, LOS ANGELES TIMES, May 16, 1982 (reprinted in Gary Watson, Responsibility and the Limits of Evil, in Responsibility, Character, and the Emotions, 268-71, 272-74 (ed. by Ferdinand Schoeman; Cambridge 1987). His California fellow death row inmates were so disconcerted by Harris’s demeanor that they cheered his impending death.


31 On the extent to which Hart’s views still pervade criminal law, see, e.g., Sanford H. Kadish and Stephen J. Schulhofer, CRIMINAL LAW AND ITS PROCESSES 536 (7th ed. 2001) (discussing the assumption of free will and rejection of determinism).

1. Choice as a moral imperative.

(a) Kant’s GROUNDWORK – The role of rationality and autonomy in our moral deliberations, as with much else in moral theory, still traces its modern origins to Kant. The commitment to rationality in contemporary normative ethics, and the nature of the reasoning it employs, begins, at least popularly, with the GROUNDWORK PRINCIPLES OF THE METAPHYSICS OF MORALS. Kant articulated his starting point by asking, “Do we think it a matter not of utmost necessity to work out for once a pure moral philosophy completely cleansed of everything that can only be empirical and appropriate to anthropology?” That it was possible to construct a moral philosophy based upon [“pure thinking”] altogether à priori and outside human psychology was taken as an incontrovertible fact: Kant contended, without entertaining any doubt and despite acknowledging his intellectual debt to Hume, that “matters of morality [derived from and productive of an epistemologically a priori synthetic proposition can] easily be brought to a high degree of accuracy and precision even in the most ordinary intelligence.” For present purposes, it is enough to appreciate Kant’s commitment to rationality was wholly formal. How individuals conduct themselves in fact is, literally, beside the point in this context. The normative/descriptive division was complete.

Kant’s formal commitment to a foundation for morality required, famously, that he assume the profoundly un-empirical conclusion that luck could have no impact on the will:

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33I have discussed much of this material in greater detail in A Jurisprudence for Punishing Attempts Asymmetrically, 6 BUFF. CRIM. L. REV. 951, 963-71 (2003).

34Certainly our commitment to the dominance of reason and rationality goes back to the Greeks and early Hebrews. See, e.g., Plato, Crito, in GREAT DIALOGUES OF PLATO 450 (Trans by W. H. D. Rouse; Mentor 1984) (“My way is and always has been to obey no one and nothing, except the reasoning which seems to me best when I draw my conclusions.”). For a critical analysis of this form of reasoning, see A. D. Woozley, LAW AND OBEDIENCE: THE ARGUMENTS OF PLATO’S CRITO 22-27 (U.N.C. Press 1979). “See, I am giving you today the blessing and the curse.” (Deut. 11:26) See also Hermann Cohen, RELIGION OF REASON: OUT OF THE SOURCES OF JUDAISM 408 (trans. by Simon Kaplan; Frederick Ungar Publ. Co., 1972). Maimonides reconciled the Aristotelian tradition with Judaism in Maimonides, THE GUIDE FOR THE PERPLEXED (Dover ed. 1956); see generally Kenneth Seeskin, JEWISH PHILOSOPHY IN A SECULAR AGE 38-40 (State University of New York Press, 1990).


36Id. at 10 (“Logic can have no empirical part . . . [o]therwise it would not be . . . a canon for understanding and reason, valid for all thinking and capable of demonstration”). Cf. Robert Audi, THE CAMBRIDGE DICTIONARY OF PHILOSOPHY,56 (Cambridge 1995) (observing that “rationalists virtually always assert or imply that . . . there is synthetic a priori knowledge,” that is, a free standing, non-derivative principle).

37Id. at 57.
A good will is not good because of what it effects or accomplishes – because of its fitness for attaining some proposed end: it is good through its willing alone – that is, good in itself. . . . Even if, by some special disfavor of destiny or the niggardly endowment of step-motherly nature, this will is entirely lacking in power to carry out its intentions, . . . even then it would still shine like a jewel for its own sake as something which has its full value in itself. Its usefulness or fruitfulness can neither add to, nor subtract from, this value.  

When the categorical goodness of will represents reason’s and autonomy’s raison d’etre, and thus exists independent of the world, it produces a view of morality that is impervious to causative laws. It literally exists apart from reality.

The GROUNDWORK is neurobiologically innocent: its message is simply choose good. Its continuing vitality in the jurisprudence of our criminal law is, accordingly, subject to qualification. We know as a matter of common observation and behavioral genetics, for example, that events, conditions and occurrences – in fact, all of one’s experiences and many over which actors have no control – impact everything we do every time we act. Hume understood this point when he noted that “nature will always maintain her rights, and prevail in the end over any abstract reasoning whatsoever.” Consider the ordinary incidents of birth to realize the point: our genetic make-up, our initial socio-economic circumstances (at least), our access to and use of prenatal and perinatal care, our introduction (or not) to moral and religious values, and substantial components of our personality

38Kant, GROUNDWORK, supra note # –, at 60.


40I am not suggesting that Kant was unconcerned with practical ethics; he was. Even here, however, he was convinced that no one could be forced to do that which his will opposes. See, e.g., Immanuel Kant, Moral Compulsion and Practical Necessitation, in LECTURES ON ETHICS (Trans. by Louis Infield (Harper Torchbooks 1963).

41John T. Cacioppo, Greg G. Berstron, Tyler S. Lorig et al., Just Because You’re Imaging the Brain Doesn’t Mean You Can Stop Using Your Head: A Primer and Set of First Principles, 85 J. PERSONALITY & SOC. PSYCHOL. 650, 650 (2003)

42David Hume, AN ENQUIRY CONCERNING HUMAN UNDERSTANDING 41 (L. A. Selby-Bigge and P. H. Nidditch, eds.; Oxford 3rd ed. 1975). In what reads like a direct challenge to Kant, (but was probably directed at Samuel Clarke, see Rawls, LECTURES supra note # –, at 70-3), Hume disputes the distinction between reasoning and experience, arguing that the former gives form to the latter. Reasoning is the process of making sense of our experience and not the “result of our intellectual faculties, which, by considering a priori the nature of things . . . [somehow] examin[es] the effect, that must follow from their operations.” Hume, supra at 43-45 n.1.
– all are determined in whole or in part at the moment of conception and thereafter. They are largely a matter of moral luck. We do not choose our biological parentage and all that comes therewith, nor do we choose the environments into which we are born. Moreover, we know that all of the events, conditions and occurrences one faces throughout life have the capability of bringing about lasting changes in one’s development. The impact of such phenomena on one’s penchant for crime seems too undeniable to disguise under any settled view. And yet our jurisprudence seems to take this measure of a human into account only in the capital sentencing phase, that is, after conviction of capital crimes, and then its usefulness is always potentially undermined.

(b) Hart’s “choosing system”– Like Kant before him, Professor H. L. A. Hart often assumed that virtually everyone has the capacity and opportunity to choose good. In his famous critique of determinism, Hart’s asked his readers to view the law as a “choosing system, in which individuals can find out, in general terms at least, the costs they have to pay if they act in certain ways.” The conception of choice implicates directly the compatibilist view of the will spawned by Kant. Hart’s analysis began by noting that individuals make choices routinely and predict future events as “a matter

43 See, e.g., Edelman, BRIGHT AIR, supra note # –, at 174 (noting that human organisms arrive more or less adapted to our environment in a process that occurs even when the environment springs surprises on us).

44 See Thomas Nagel, Moral Luck, in MORTAL QUESTIONS 24, 25-6 (Cambridge 1979) (originally published in PROC. ARIST. SOC’Y (Supp. vol. L; 1976)).


46 See infra section ----.

47 See infra text accompanying notes ----.

48 “Often” is a necessary qualifier because Hart also understood that, in fact, many individuals lack the capacity – whether in virtue of deficient intelligence or education – to make what the rest of society considers a “reasonable” decision. On the need to individualize justice in a way that accounts for non-pathological deficits, see H. L. A. Hart, PUNISHMENT AND RESPONSIBILITY: ESSAYS IN THE PHILOSOPHY OF LAW 136-57 (Oxford 1968) (hereafter, “Hart, PUNISHMENT AND RESPONSIBILITY”).

49 Id. Accord H. L. A. Hart, Prolegomena, in PUNISHMENT AND RESPONSIBILITY at44 (“The price is justly exacted . . . because within the framework the individual is given a fair opportunity to choose between keeping the law required for society’s protection or paying the penalty by being punished.”). I have elaborated on this point in A Jurisprudence for Punishing Attempts Asymmetrically, 6 BUFF. CRIM. L. REV. 951, 967-71 (2003).

50 Rawls, LECTURES, supra note # –, at 277-90.
of empirical fact, and no form of ‘determinism,’ of course, can show this to be false or illusory.”

The determinist claim, on this view, consists of two moves: First, it posits that human behavior is “subject to certain types of law (although this has not been shown to be true).” Second, if determinism could be shown to be the case, then the distinction the law draws between acting or not acting under excusing conditions evaporates as “unimportant, if not absurd.”

Hart describes the planning and execution of a testamentary devise to illustrate his position. When a testator makes a will and the estate is administered posthumously thereunder, the testator has, according to Hart, in a real sense “caused the outcome of the distribution made.” Hart acknowledges that the terms of the will issue from a “complex set of conditions, of which all other members were as necessary for the production of the outcome as his choice.” He also notes that (1) the set of conditions that led to the choice is composed of conditions the full scope of which we may never know, and (2) the testator’s choice itself was the product of “some set of sufficient conditions” of which we are ignorant. But even assuming (1) and (2) are correct, Hart insists (3) that these factors neither falsify the testator’s knowledge that he can make a choice to determine the distribution, nor undermine the pleasure the testator receives from making the choices. If determinism cannot show this last statement (3) to be false or illusory, Hart concludes, “I for one do not understand how it would affect the wisdom, justice, rationality, or morality of the system we are considering.”

Hart’s view reflects a kind of binary theory of utility. He allows that determinism exists as a “set of sufficient [causal] conditions” the full array of which we cannot explicate, but he argues for proceeding as if it did not. This view of determinism accepts that events have antecedent causes, but holds that in an important, inexplicable manner agents control their own mental states, even though those states are themselves causally determined. Although in a practical sense I will not here

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52 Id. at 29.

53 I have elaborated on this point in A Jurisprudence for Punishing Attempts Asymmetrically, 6 Buff. Crim. L. Rev. 951, 967-71 (2003).

54 All of the quote in this paragraph are from Hart, Punishment and Responsibility, supra note # –, at 29.

55 See Alan Norrie, Freewill, Determinism and Criminal Justice, 3 Legal Studies 60, 62 (1983); John L. Hill, (Note) Freedom, Determinism and the Externalization of Responsibility in the Law: A Philosophical Analysis, 76 Geo. L.J.2045, 2056 (1988). Compare Michael S. Moore, Causation and the Excuses, 73 Cal. L. Rev. 1091, 1092 (1985) (acknowledging the pressure of determinist forces but arguing that “moral responsibility for an action should be ascribed to an actor even when that action was caused by factors over which he has no control”).

56 Hill, supra note # –, at 2052 n. 27. Hill also attributes to “soft determinists” the notion that free action is absent only if an agent is caused to act against his will. Id. at 2052 n. 28; accord Norrie, supra.
challenge Hart’s position, at least one question still has to be asked: Did Hart pose the right question? Alan Norrie has argued that the important question Hart asks is not whether or not human behavior is subject to scientific laws; that is conceded. Rather, Hart asks “whether or not . . . it can be seen as caused by conditions external to the will of the actor,” thereby placing the burden on the observer to demonstrate that the neuroscience of behavior is contrary to Hart’s perception. In contrast to his burden-shifting question, one can reply that not only can events be seen as caused by conditions external to the will, we know that events are effected by external causes, a view Hart concedes. Thus if it is admitted that under some description (for example, theoretical reasoning) there are conditions external to the individual which determine conduct in some important way, then Hart’s critique, like those of almost everyone else, can be viewed as suffering some question-begging.

Nor will it do to argue that choices exist because a gun pressed to the temple of a pedophile, for example, would prevent pedophilia; the pedophile would thus exercise choice and control. In fact, this argument makes my point. Natural selection operates to put survival near the top of anyone’s motivational list. The fear of death operates to inhibit conduct in any sensate creature if the conduct is in any way inhibitable. This conclusion is not merely based on the fact that individuals are guided by reason and, therefore, wrongdoers can forego unwelcome conduct simply by using those processes to inhibit proposed or intended actions. From this perspective, virtually no misconduct short of the worst imaginable psychopathology deserves any exculpation. But we acknowledge exculpation based on duress, for example, which is not pathological conduct. If a gun to the head were the baseline for determining volitional control, by a parity of reasoning we should provide sufficient resources and exercise the will to inflict fear of death on the convicted pedophile. Perhaps we can also prevent bears (or wolves) from eating or reproducing. With sufficient force or its threat, that is, we can prohibit virtually any conduct that we, as a society, have the will to prohibit, excretion, sleep and death excepted.

But the move from rationality to deterrence works in many ways. It cannot be a sufficient factor that the person, unlike the bear or wolf, understands language and has some capacity for reason. That just means that all species that understand communicated signals triggering fear reactions can be deterred, and it assumes the very proposition at issue: that some capacity is both necessary for effective deterrence – fear of death – and sufficient without incurring the costs that such a policy

57 Norrie, supra note # –, at 61.

58Hart, PUNISHMENT AND RESPONSIBILITY, supra note # –, at 153-54 (likening the objective standard used in criminal negligence to absolute liability in cases where the defendant lack capacity).

entails. What is the sufficient capacity-in-fact\textsuperscript{60} for effective, affordable deterrence to work is precisely the question at issue.

No serious neuroscientist advocates opening the prison doors and permitting the violent crazies to run free on the roads. Punishment is not procedural or mechanical in the way that the burden of proof is or that evidentiary standards of causation are, although these standards can be dispositive in many cases. Punishment is substantive because very few conditions can grab an individual’s being as tightly as incarceration, and we need to cease viewing the legal universe as binary: guilty or not guilty, free will or determinism, yes or no. The universe is continuous not categorical; dualist thinking tends to distort our view of the world. As Sapolsky points out, “scientists typically struggle to think in continua, a style that is a logical extension of thinking probabilistically;” this is especially true in psychological disciplines “where, for example, there is a smooth genetic continuum between schizophrenia, a disorder of wildly disruptive delusional thinking, and schizotypalism, in which there are far milder ‘metamagical’ delusions.”\textsuperscript{61} The capacities that make up our beings exist on continua; they do not exist in neatly confined boxes.

2. Character and Law

In his Nicomachean Ethics, Aristotle insists that each individual is responsible for his own character because his actions establish that character.\textsuperscript{62} Hume advanced a similar idea in the Treatise to account not only for the source of our actions, but for our reactions to the conduct of others as well: “Actions are by their very nature temporary and perishing; and where they proceed not from some cause in the characters and disposition of the person, who perform’s them, they . . .

\textsuperscript{60}The phrase “capacity-in-fact,” as used here, is composed of desires which are themselves constituted by sub-capacities. The occurrence and control of desires, for example, entail different capacities. Fully flourishing, individuals educated in rudimentary ethical behavior often can contain the emergence of occurrent desires and, in addition, can commonly control the will to act upon them. Some damaged people, however, lack the capacity to contain the occurrence of wicked desires but generally possess sufficient capacity to control them; that is, they find methods for holding them in check that do not entail criminal misconduct. Some substantial number of damaged actors, however, can neither contain the onset of occurrent wicked desires nor control their ability to forego acting upon them. Such actors totally lack capacity-in-fact for volitional control. I take this point up in the final section of the article. See infra text accompanying notes —.

\textsuperscript{61}Sapolsky, supra note # –, at 1789.

\textsuperscript{62}Aristotle, Nicomachean Ethics iii.5.1114a3-11 (Trans. by David Ross Oxford, 1987), maintained that by virtue of their slackardly dispositions, men are “responsible for becoming men of that kind.” For a neurologically-informed critique of this view, see Carl Elliott, The Rules of Insanity: Moral Responsibility and the Mentally Ill Offender 29-31 (Suny 1996), who notes that “in many ways we are clearly not responsible for our characters, at least as Aristotle implies.” Id. at 30.
can neither redound to his honor, if good, nor infamy, if evil." He elaborated a dispositional (as opposed to a situational) viewpoint with an example of homicide.

Take any action allow’d to be vicious: Wilful murder, for instance. Examine it in all lights, and see if you can find that matter of fact, . . . which you call vice. In whichever way you take it, you find only certain passions, motives, volitions and thoughts. There is no other matter of fact in the case. The vice entirely escapes you . . . till you turn your reflexion into your own breast, and find a sentiment of disapprobation, which arises in you, toward this action. It lies in yourself, not in the object.

On Hume’s view, we disapprove of vicious conduct not because it is vicious; rather, we identify it as vicious because we, in turning to our own dispositions (our “breasts”), disapprove of it. Morality, Hume tells us, resides in us, in our characters and dispositions. Such a determination would be relatively unimpeachable if all who are judged “bad” possessed control-in-fact over their characters.

In *A Utilitarian Theory of Excuses*, Richard Brandt follows the Aristotelian/Humean line; he argues for a rule-utilitarian theory of excuses according to which moral demerit is judged by the following dictum: “An agent is morally blameworthy . . . for an act if, and to the degree that, the moral code the currency of which in that society would maximize utility would condemn . . . him for

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64 I have elaborated this basic social science distinction in *The Problems with Blaming*, in Michael Freeman and Oliver Goodenough, eds. *Law, Mind, and Brain* Ch. 6 (London: Ashgate Publishing, 2009).

65 Hume, *Treatise*, supra note # –, at 468-69.


67 On rule utilitarian thought, see John Rawls, *Rule Utilitarianism*, in *Philosophical Perspectives on Punishment* 82 (ed. by Gertrude Ezorsky, S. U. N. Y. Press 1972) (originally published as Two Concepts of Rules, 44 Philos. Rev. 3 (1955) (distinguishing between justifications for the practice of punishment generally, and particular applications, and defending utilitarianism as an explanation for moral judgments thereunder); John Rawls, *Legal Obligation and the Duty of Fair Play*, in *Law and Philosophy: A Symposium* 3, 9-10 (ed by Sidney Hook, N.Y.U. Press 1964) (defining the duty of fair play as a scheme in which everyone benefits by mutual social cooperation and in which everyone or nearly everyone accepts certain restrictions on liberty to enjoy the benefit which is, in a sense, free; stated conversely, a social arrangement is unstable insofar as any person knows that he can fail to cooperate but still enjoy the benefit).
Condemnation is appropriate, therefore, whenever the actor lacks an internalized motivational set that should produce appropriate feelings of guilt or shame or dishonor and the like in response to conduct that violates the moral code, absent a traditional assessment of excuse. Motivation is key; an agent’s conduct is excusable, therefore, if but only if, “an objectively wrong action (or an action in some way out of order) . . . does not manifest some defect of character.”

Brandt’s description of character, which he distinguishes from “just a trait of personality,” is terse; it is some internal quality that goes beyond a trait to include more or less permanent dispositions, so that for Brandt the crucial moral question is whether or not people would be “trained to be motivated, and to feel, in certain ways about certain things, namely, to have an aversion to breaking a promise, to feel guilty about doing so,” that is, to act according to utility-maximizing rules of conduct.

Implicit in this approach is the Aristotelian-Humean belief that the explanation for conduct reflecting character is internal to the actor and his desires, even if not fully within his control. On Brandt’s view, “a defect of character is, or includes, a defect of motivation.” Presumably this means that the actor could have learned appropriate conduct but failed to do so because he lacked the appropriate motivational reinforcement. Whether any particular individual could be so trained, in the sense that he has adequate capacities-in-fact for cognition and volitional control and has had the opportunity to learn same, is the question,
but it is not an issue on which Brandt opines.  

Brandt’s view also reflects neurobiological innocence. No serious scholar in the field of brain sciences doubts that genetic endowment, for example, plays a substantial role in the construction of personality. Yet it is precisely these developments that our jurisprudence is just now beginning to take any cognizance of, and then only when the ultimate sanction of death is at stake. The basic problem raised by this view of character rests on the problematic assumption that all those wrongdoers whom the law deems sane and competent, for example, have both control over their character and that character in general is relatively stable over time. Although the latter point is contestable, we can assume for now that individual moral development goes through stages and

\[\text{Cf. Brandt, supra note \# --, at 351-52 (stating that excuses entail societal costs insofar as the wrongdoer or potential wrongdoer believes that the clever lawyer will help him use the excuse to avoid incarceration).}\]

\[\text{See, e.g. David Wasserman and Robert Wachbroit, Introduction: Methods, Meaning, and Morals, in Genetics and Criminal Behavior 1, 12-13 (ed. by David Wasserman and Robert Wachbroit: Cambridge 2001); Kenneth Taylor, On the Explanatory Limits of Behavioral Genetics, in Genetics and Criminal Behavior, supra at 117, 125-26 (summarizing data that suggest that some criminality reflects defects in an individual’s “basic cognitive or affective architecture, citing B. Maughan, Childbirth Precursors of Aggressive Offending in Personality-Disordered Adults in S. Hodgins, Mental Disorder and Crime (1993) (noting that while only 7% of the general population suffers from antisocial personality disorder, 45% of a population of convicted violent felons so suffer)); M. Virkkunen aand M. Linnoila, Serotonin in Personality Disorders with Habitual Violence and Impulsivity in Hodgins, supra (linking habitual aggressive behavior with reduced serotonin levels); and J. Volavka, D. Martell, and A. Convit, Psychobiology of the Violent Offender, 7 J. Forensic Sci. 237 (1992) (suggesting that reduced serotonin follows from a genetic mutation)).}\]


\[\text{Cf. Elkhonon Goldberg, The Executive Brain: Frontal Lobes and the Civilized Mind 150 (Oxford 2001) (suggesting that data from neuroscience require a “new legal construct of ‘inability to guide one’s behavior despite the availability of requisite knowledge’ may be needed to capture the peculiar relationship between frontal lobe dysfunction and the potential for criminal behavior”). See id. at 108-09 (describing a phenomenon characterized by the “non-pathological diminution of the ability to form a [common sense] theory of the mind,” i.e., the inability to sense how others are reacting internally to us as reflecting “normal variability” in frontal lobe functioning).}\]

becomes more-or-less fixed in Kohlbergian terms at some point in time with respect to at least some areas of conduct. Even if this is correct, however, the point overlooks or dismisses as unimportant an incontrovertible fact: Who we are at \( t \), the moment of wrongdoing on which we focus for rendering moral and legal accounts, is a function of all the antecedent influences whose impact on the decision made at \( t \) are certain, albeit not fully discernible in the aggregate. Nor will it do to claim, as many do, that because determinism is universal and affects all of us, it can be dismissed. For now, suffice it to say that “universal” is not the same as “uniform.” We are each affected uniquely: some for better, some for worse. This brute social fact of existence challenges our conception of freedom because the conventional wisdom posits that free actions “should not be determined by antecedent conditions and should be fully explained only intentionally, in terms of justifying reasons developed and formed, remains so in some areas of conduct, while other authorities replace parental authority in other areas and create in the human mind the same subservient nonautonomous opinion which is a mere reflection of external manifestations of attitude by such authorities”). As Daniel Goleman, EMOTIONAL INTELLIGENCE xiii (1995) notes, “the neurological data suggest [the existence of] a window of opportunity for shaping our children’s emotional habits.”


\[79\] Bernard Williams makes this point about the instability of character judgments made at, or in reference to, a fixed point in time, in terms of the criteria needed to make such a determination:

[W]hat one does and the sort of life one leads condition one’s later desires and judgments. The standpoint of that retrospective judge who will be my later self will be the product of my earlier choices. So there is no set of preferences both fixed and relevant, relative to which the various fillings of my life-space can be compared. If the fillings are to be evaluated by reference to what I variously . . . want, the relevant preferences are not fixed, while if they are to be evaluated by what I now . . . want, this will give a fixed set of preferences, but one that is not necessarily relevant.

Bernard Williams, Moral Luck, in MORAL LUCK: PHILOSOPHICAL PAPERS, 1973-1980, 29 (Cambridge 1981) (rejecting, generally, the Kantian hypothesis that good or bad will is “unconditioned” [or] . . . free from external contingency”).

\[80\] See, e.g., Sanford Kadish, Moral Excess, McGeorge L. Rev. 63, 75-6 (2000); Moore, Causation and the Excuses, supra note # –, at 1092 (arguing that “moral responsibility for an action should be ascribed to an actor even when that action was caused by factors over which he has no control”); Stephen J. Morse, The Moral Metaphysics of Causation and Results, 88 Calif. L. Rev. 879, 886 (2000).

\[81\] This is a basic fact of our genes and neurobiology. See, e.g., Matt Ridley, NATURE VIA NURTURE: GENES, EXPERIENCE, & WHAT MAKES US HUMAN (HarperCollins 2003) (hereafter “Ridley, NATURE VIA NURTURE”); Damasio, DESCARTES’ ERROR, supra note # – passim.
and purposes.” Yet antecedent events and conditions obviously do matter greatly, and everyone knows it; our well nurtured intuitions shout out this basic understanding routinely. Findings from behavioral genetics and neuroscience have, for the most part, provided empirical support for our intuitions.

II. The View from Genetics, Neuroscience and Law

Darwin’s insight is simple, yet often misunderstood. It is this. If only some of [a species] can survive, and if what ever helped them survive is passed on to their offspring, then the offspring will be better adapted than their parents were. In this way the organism becomes designed, by the blind processes of copying and selection, for the environment in which they live. As Dawkins puts it, if you have variation, selection, and heredity, then you must have evolution.84

It is one of the oddest facts of nature that the unfeeling process of natural selection can construct creatures who themselves have feelings, who are sensitive to the pain of others, and who can work to make the pain go away.85

Virtually everything else either informs Darwinian selection or follows therefrom.

Up to this point, I have tried to lay out the settled jurisprudential understanding of individual moral psychology. Its predicate is formal and its model reflects the belief that everyone has the capacity and opportunity simply to choose good. Although it is an overstatement to conclude, as


83 Even our ordinary, everyday usage underscores this fact. We routinely talk to our friends and neighbors across fences – and without ever second-guessing ourselves (a human quality of mixed virtue) – about our genetic make-ups, including our likenesses to Mom or Dad (“like father, like son,” “the acorn never falls far from the tree,” and so on), to our sisters or brothers, and the variations nature has carved out among our siblings. On the importance of family selection studies, see, e.g., Robert Plonim, Nature and Nurture: An Introduction to Human Behavioral Genetics 38-41 (Pacific Grove, Cal: Brooks/Cole Publ. Co. 1990).

84 Susan Blackmore, Meme, Myself, I, New Scientist, March 13, 1999, at 40 (page cites unavailable on Nexis). Blackmore is a lecturer in psychology at the University of West England, and author of The Meme Machine (Oxford 1999). Cf. Paul Bloom, Descartes’ Baby: How the Science of Child Development Explains What Makes Us Human 104 (BasicBooks 2004) (“If there is variation in some trait, and this trait is passed from parent to child, the variant that leads to more offspring will tend to win out.”

85 Bloom, Descartes’ Baby, supra note –, at 123-24.
Professor Hart did, that the law is a “choosing system,” there is no doubt in anyone’s mind that the law hopes to influence human behavior, and the criminal law expresses this hoped for deterrence advertently. The basis on which the law and lawmakers make behavior-shaping preferences manifest rests largely upon the theories of human nature just summarized. Those theories require some twisting and tweaking from time to time. An assumption underlying this work is that, in general, the broader the source of reasonable epistemic deference, the better prepared we are to make public policy decisions. Neuroscience, behavioral genetics and the brain sciences generally ought to be among the sources that routinely inform our jurisprudence far more than they do now, which is mostly limited to death penalty litigation and the proof (or lack thereof) of injury. This section offers several sketches that frame the basic currents in the brain sciences.

A. Among the Most Basic Assumptions

After many years researching how phenotypes are expressed (that is, on the operation of our proximate sources of genetic inheritance), we now know that the chromosomes we receive from our parents and all the DNA therein are not composed simply of pre-impressed protein producing strings of nucleotides. Rather, our genetic inheritances are composed of the very stuff that generates open-ended selection, selection on-the-ground, so to speak. This remarkable process both permits – and suffers us – as individuals and in common to adapt to our own unique environments. The function of much of our DNA exists ready, generally, to respond to the environment. We are, in every way, the products of the fantastic number of synergies that merge nature and nurture, and nurture and nature, and so on and so on and so on in an endless synergy. And we can effect some changes for the betterment of all. On what bases does this prediction rest? What follows is a list that includes many if not most or all of the basic assumptions upon which a rich variety of empirical research, and many inferences therefrom, emerge.

1. Human beings, like every species of every genus alive at any time in earth’s history, have evolved through the processes of heredity, variation and thus natural selection. This process reflects millions of years of adaptation such that the basic architecture of our anatomy and physiology is itself millions of years in the making. Moreover, as creatures of heredity, variation and natural selection, maintaining

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86 See generally Owen D. Jones and Timothy H. Goldsmith, Law and Behavioral Biology, 105 Colum. L. Rev. 405, 459-60, 468-75 (2005) (noting that the demand for good will and its availability are inversely related, and that legal sanctions are often viewed as prices imposed on unwanted behaviors with the hope of reducing their incidence).

87 See, e.g., Model Penal Code §1.01(2) (American Law Institute, Official Draft 1962) (describing the purposes of the MPC’s provisions on sentencing and treatment); Federal Sentencing Guidelines Ch. 1, Pt. A2 (setting out the basic statutory mission of the Sentencing Reform Act of 1984, 28 U.S.C. §994(a)).
“fitness,” the ability to reproduce our phenotypic design, is a never-ending process.88

2. Phenotypic expression in an unselected population – that is, how our genes express themselves in a population living in its natural habitat – tends to be distributed in standard phenotypic fashion, mutations expected.89

3. The brain (and the mind, if they are different) are also products of this enormously complex process; they too generally reflect functional adaptations (polymorphisms) to the environment in which they evolved.90

4. The “psychological constituents of human . . . nature, like the anatomical and physiological elements thereof, exhibit adaptive design for the solution of particularly recurrent problems faced by our ancestors.”91 Thus, decisions we make today are the product of neurobiological mechanisms that were initially developed in

88Excellent introductions to this topic for lay people include Steve Jones, THE LANGUAGE OF GENES: SOLVING THE MYSTERY OF OUR GENETIC PAST, PRESENT AND FUTURE (Anchor Books 1993); Mark Ridley, THE COOPERATIVE GENE: HOW MENDEL’S DEMON EXPLAINS THE EVOLUTION OF COMPLEX BEINGS (Free Press 2001); and Rose, supra note # –.

89William R. Clark and Michael Grunstein, ARE WE HARD WIRED? THE ROLE OF GENES IN HUMAN BEHAVIOR 88-92 (Oxford 2000); Plonim, supra note # –, at Ch. 3.

90Although I had once hoped to elaborate on the difference between brain and mind, I have now concluded that I cannot do so; the distinction is too far beyond my current interests. Suffice it to say that I think there are gaps between intention and neuronal firings that we may never eliminate as sources of inquiry. John R. Searle, RATIONALITY IN ACTION Ch. 3 (MIT 2003). There is some evidence to believe, for example, that the gap is filled, in part, by ion activity at the quantum level. Schwartz and Begley, supra note # –, at Ch. 8. Because I believe that it is neurons all the way down, there must be another question, which also all runs the way down, and that question addresses the nature and source of human intellectual curiosity. As to how it might work, in which consciousness, an epiphenomenon, is embedded in complex networks of neural substrata that are causative, see Gerald M. Edelman, WIDER THAN THE SKY: THE PHENOMENAL GIFT OF CONSCIOUSNESS esp. Ch. 7 (Yale 2004) (describing consciousness as a “phenomenal transform,” whereby neural activities enable the higher order distinctions that make possible our ability to experience qualia). For a very different approach which seems to redefine the problem, see Noe, supra note # – (arguing that consciousness arises out of our interactions with the physical world around us).

a primitive stage of human existence.\textsuperscript{92}

5. The basic morphology of our DNA includes architectural designs in our neuroanatomy (our cerebral cortex and subcortical mechanisms) and our neurophysiology (neurotransmitters, hormones and their regulators, and the like) that are themselves the phenotypic outcome of our genotype as they respond to the actual environments in which life occurs.\textsuperscript{93} It follows, then, that “two identical genotypes, placed in two different environments, may produce two quite different phenotypes with respect to any particular characteristic, behavioral or otherwise.”\textsuperscript{94}

6. Notwithstanding the statements immediately above, it is also the case that many of the features that constitute human decision-making are inaccessible to us through introspection because “the phenomenology of deliberation and reasoned choice is often illusory and reconstructive.”\textsuperscript{95} The neurologist Michael Gazzaniga makes a basic point that our jurisprudence and moral philosophy would do well to receive and understanding more fully and therefore to be moved by its deep implications:

Nowhere is the issue of what constitutes ourselves and our brain more apparent than when we see how ineffectual the mind is at trying to control the brain. In those terms, the conscious self is like a playground monitor, a hapless entity charged with the responsibility of keeping track of multitudinous brain impulses running in all directions

\textsuperscript{92}Owen D. Jones refers to this phenomenon as “Time-Shifted Rationality,” the idea being that our ability to process our cultural experiences occurs in brains that evolved under very different circumstances than we face today. Owen D. Jones, Time-Shifted Rationality and the Law of Law’s Leverage: Behavioral Economics Meets Behavioral Biology, 95 NW. L. REV. 1141 (2001) (arguing that what we perceive as irrationalities are often likely to be products of a temporal mismatch between the environment in which natural selection shaped the brain to function and different, modern environments that technology has only recently enabled us to study). I would add to his general description only that this shift in decision-making continues to occur within a selectional system that includes both the ongoing temporal and shifting effects of natural selection and how those effects operate neurobiologically (and on balance) to produce some outlying standard deviation of the population who have or perceive themselves as having a small chance of success, i.e., inclusive fitness.

\textsuperscript{93}See, e.g., Schwartz and Begley, supra note # – (discussing efforts to reprogram patients suffering with Obsessive-Compulsive Disorder); Damasio, supra note # –, at 11.

\textsuperscript{94}Clark and Grunstein, supra note # –, at 90.

\textsuperscript{95}Wilson et al., supra note # –, at 383.
7. Evolutionary theory, among other resources within biology as a discipline, “can be useful in predicting, at least statistically, both the environmental causes of [psychological brain] states and the nature of the responses that are likely to follow.”

8. Our conception of nature and nurture, often serving as far more than a crude heuristic, is in need of substantial overhaul. It has never, in fact, been the case that either genes or the environment drive human behavior. As Matt Ridley points out, “Genes are not puppet masters. . . . They are active during life; they switch each other on and off; they respond to the environment.”

B. Selection at work – opened-ness.

These assumptions lead to the conclusion that evolution – natural selection, heritability and variation – is an open-ended process which rests on a genomic structure that is at once both fixed – we all share roughly 99.9% of the same genome – and fluid. Even the once prevailing wisdom that the adult brain was hard-wired and fixed, immune to change, is simply wrong. Neuroplasticity, the

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96Michael S. Gazzaniga, The Mind’s Past 23 (California 1998). For a similar view from social psychology, see John A. Bargh and Tanya I. Chartrand, The Unbearable Automaticity of Being, 54 AM. Psychologist 462 (1999) (noting that most of our self-regulation, including our perceptual apparatus and perceptions, lie outside conscious awareness). This is not to say that our information processing is simply a helter-skelter, ad hoc affair; usually it is not: we plan and introspect and use our cognitive resources in decision-making. It is to claim, however, that our information processing mechanisms are not entirely apparent even when we attempt to introspect on how those mechanisms operate; we could be better informed.


98Ridley, Nature via Nurture, supra note # –, at 6.


100Neuroplasticity, the ability of neurons in the brain to generate new connections and rewire or remodel the brain, is never ending, although it is sometimes more limited in adults than in children. See, e.g., Schwartz and Begley, supra (detailing the history of the overthrow of the once conventional wisdom); Elkhonon Goldberg, The Wisdom Paradox: How Your Mind Can Grow Stronger As
ability of neurons in the brain to generate new connections and rewire or remodel the brain, is never ending, although it is sometimes more limited in adults than in children. Our genome is fixed inasmuch as we humans share all but a tiny percentage of the same DNA (~.01%) and fluid in that actual experiences are reflected in how any given individual adapts to his or her unique environment. The vehicle for these neuronal changes are genetic; they are preset to react to the environment, what ever it might be. This section begins with a discussion of the composition of our genome and moves to the interdependence of “nature” and “nurture” in the making of an individual. The terms nature and nurture are placed in cautionary marks to suggest that although the dichotomy may yet provide some heuristic benefits, those benefits come at the cost of a basic misconception.

1. Our Genetic Makeup.

Geneticists have uncovered a store of fundamental data concerning the processes through which evolution by natural selection occurs. We have known for some time that genes provide the major vehicle through which natural selection operates. One of the discoveries is that only about 3% of our DNA is pre-committed to phenotypic expression: the right number of fingers in roughly the right place with the expected shape, the point at which puberty begins and chins drop and hair grays and the rest of our bodies fall prey to the ravages of gravity, the morphology of our brains, and so on. But there is far more to the DNA within us than that small percentage. It turns out that some

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2. Of course, mutation and genetic drift are also necessary for evolution, but those topics are well outside the scope of this paper. See, e.g., The Biology Project, University Of Arizona, Genetic Drift Simulation, http://www.biology.arizona.edu/evolution/act/drift/drift.html.


5. Of the roughly three billion chemical bases that compose a molecule of DNA, the most commonly cited figure indicates that the human genome is roughly 99.9% identical among all homo sapiens everywhere. See, e.g., National Institute of Health, supra note # –. Thus, of those three billion bases pairs – the familiar A-T and G-C – only a small percentage actually code for proteins that provide
of that 98+% we have previously labeled “Junk DNA” is not “junk” at all.\footnote{See, e.g., Life Science Weekly, Expanded Reporting Sec., Apr. 24, 2007 (reporting that Stanford biologists have concluded that “the presence of ‘junk DNA,’ . . . might make an important contribution to the evolution of complex organisms”) at 2007 WLNR 7426550; Scientists Explore Function of “Junk DNA,” Science Daily, Nov. 26, 2006, at http://www.sciencedaily.com/releases/2006/11/061113180029.htm.; Karen Lurie, Junk DNA, ScienceCentral News, July 20, 2004 (summarizing news stories from the online version of Science, May 6, 2004 at http://www.sciencentral.com/articles/view.php3?type=article&article_id=218392305; Genius of Junk (DNA), Catalyst, July 10, 2003, at Http://www.abc.net.au/catalyst/stories/s898887.htm; Natalie Angier, Reading The Book of Life: Genome Shows Evolution Has An Eye for Hyperbole, N. Y. Times, Feb. 13, 2001, F, available at 2001 WLNR 3369653; Natalie Angier, Do Races Differ? Not Really, Genes Show , N. Y. Times, Feb. 13, 2001, F, , Aug. 22, 2000, at 2000 WLNR 3273335.} At least some of the rubble has among its constituents the precursors that might enable us to move some of our distributed capacities in one direction or another, even as the most minute variations can produce death and destruction. It turns out that our genome operates from both the inside and the outside to shape who we are.

(a) From the inside-out.\footnote{Id. at 49.} If you asked any cattle breeder anywhere in the world if the sperm he purchases from different breeds of bull affects the aggressive tendencies in his female milk-producing off-spring, the breeder will identify you immediately as the neophyte your question reveals. Ask a corn grower or the cultivator of any farm commodity if the seeds she purchases for use in her soil affect plant productivity and you will receive the same answer: “Well of course they do. Any darn fool knows that much.” The milk we drink and the meat and produce we eat (and the insulin some among us use) are fabricated in part by genetically-managed mammals and genetically-managed seeds. The tendencies for aggressiveness and augmented yields have strong genetic modules.

These genetic tendencies will come as no surprise to ornithologists. They know, for example, that cuckoos migrating from North America to Africa and back, singing and mating with a member of its own species, do so despite the fact that they grow to adulthood without ever having met a parent or sibling.\footnote{Adapted from Ridley, Nature Via Nurture, supra note # –.} Certain traits and behaviors are either instinctive or have very powerful instinctive features. To that extent, some traits and behaviors do come from within.

In some ways, we humans are no different. Human twin studies, sometimes confounded, still make important and not easily contradicted points about the sources of human behavior. Consider the well replicated fact that monozygotic (identical) twins reared apart – those with identical genetic structures raised in the same womb – show a +.62 correlation on a survey of religious attitudes, of all things – and a +.69 correlation on political attitudes (left- versus right-leaning). They do so under circumstances in which dizygotic twins reared apart, those with unique genetic structures and raised something akin to a blueprint. The rest were, until recently, disparaged as “junk DNA.”
in the same womb, correlate at .02 and 0, respectively, on the same self-assessment scales. Thomas Bouchard, who has spearheaded much of this research, makes a significant, if counterintuitive point: even on features of human conduct that most of us would likely classify as purely cultural (or nurtured) – religious and political leanings, for example – there are genetic components implicated. There is something in those variably long, alphabet strings of protein generators that tends to produce certain attitudes and behaviors, and over which we may or may not have full (or any) control. The open issues of control include whether or not certain attitudes and behaviors arise, whether they are or are not desired when they do arise, and whether or not once desired they can be contained after their appearance. But our genes do not (generally) operate alone.

(b) From the outside-in. All of our attitudes and behaviors cannot be fixed from within. We know that, for if they were, we would have to conclude (among many other things) that we have wasted a lot of time and energy on nurturing and education of all types. Learning might be seriously circumscribed. We rightly refuse to believe that we are all helpless in the face of our genetic endowment – a twist on the familiar “brain in a vat” thought experiment. Instead it turns out that some of our genes lie in wait to be turned on or off (or not) – and to turn on or off other genes (or not) – at some opportune time. This is the way selection operates in all living beings. Matt Ridley reports an important discovery about how creatures (including people) function. Whereas some genes guarantee that the overwhelming majority of individuals are born with all and only the right parts in the right places, they have other functions as well: “The function of many genes is . . . to switch other genes on or off. And the susceptibility of a gene to be switched on or off depends on the sensitivity of its promoters,” that is, on a species of genetic material that facilitates the production of proteins

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109 Id. at 79. The studies Ridley summarizes are from the leading light in this area, Thomas Bouchard. See, e.g., Thomas J. Bouchard et al., Intrinsic and Extrinsic Religiousness: Genetics and Environmental Influences and Personality Correlates, 2 TWIN RES. 88 (1999). It is clearly the case that studies using the tools of statistical of analysis of variance can overstate the affect of any single trait on an individual; heritability measures population traits not individual endowment. See, e.g., Elliott Sober, Separating Nature and Nurture, in GENETICS AND CRIMINAL BEHAVIOR, supra note # –, at 47 (commenting that twin studies using analysis of variance underestimate the assumptions they rest on). Nonetheless, the data provided in the text are impressive and worthwhile if analytically inconclusive.

Importantly, though, it is not my intention to assess any claims about the extent to which genetic factors, in contrast with other factors, affect violent behavior. I do not advance a reductionist program of the sort which claims that “certain phenomena – say, violent behavior – can be entirely explained by theories concerning apparently different phenomena.” See, e.g., Robert Wachbroit, Understanding the Genetics-of-Violence Controversy, in GENETICS AND CRIMINAL BEHAVIOR, supra note — at 25, 32-3 (critiquing ontological reductionism).

110 The skeptical hypothesis that one is a brain in a vat with systematically delusory experience is modelled on the Cartesian Evil Genius hypothesis, according to which one is a victim of thoroughgoing error induced by a God-like deceiver.” The Brain in a Vat, STAN. ENC. PHILOS. http://plato.stanford.edu/entries/brain-vat/. (2004).
when other genetic materials ("transcription factors") attach themselves. What causes such genes to switch other genes on or off? Put simply, the environment, defined broadly in terms of the unique, non-genetic experiences each individual encounters.

2. The open-ended process of selection.

As noted above, our legal system presupposes that each of us possesses a button (or a Homunculus) that turns on and off behavior as if we were flipping a kitchen light switch. This presupposition is non-controversially understood by neurologists, cognitive psychologists, neuropsychologists, and others working within the brain sciences as largely inaccurate; our cortical controls simply do not operate in a manner that resembles the Cartesian paradigm. Although the world appears to us as a unified bound picture, we now know that, while we do possess centers for most of our perceptual processing, in fact these perceptual processes are dispersed among a mind-boggling number of neurons and neuronal groupings and connections that sometimes develop in parallel and redundant loop-like patterns and sometimes along one-way paths as we experience our worlds – for good or bad – by selecting what is needed for adaptation, which works on the basis of “a preexisting capacity that an organism possesses from birth.”

What the process of selection entails in all creatures great and small is the “continual adaptive matching or fitting of elements in one physical domain [generally the frontal lobe of the cerebral cortex] to novelty occurring in elements of another [the world around us].” Natural selection operates at the level of genomes – changing or mutating our genetic alphabet – and it does so on the basis of “recognition” rather than “information.” The receptive resources produced by natural selection stand ready to absorb information from the outside and respond automatically. We are designed to be that way. And these processes are always on duty, for better or worse.

One way to illustrate the distinction between “recognition” and other forms of information

111 Ridley, NATURE VIA NURTURE, supra note # –, 31.


113 The Model Penal Code’s division of mens rea into four categories, which the drafters concede exist only on a continuum and cannot be rationally determinate without question-begging, constitutes implicit but only partial recognition of the way in which our control functions actually operate. See, e.g., Model Penal Code §2.02 and the comments thereto.

114 Gazzaniga, supra note # –, at 14. There is, in fact, some dispute about the extent to which the environment may effect brain anatomy after birth.

115 Edelman, BRIGHT AIR, supra note # –, at 74.
exchange is by reference to a familiar physical process, our immune system, which, like all of our
systems, operates on the basis of selection by recognition. When an infection or disease or any form
of invasive trauma occurs, our immune system – a spectacular biochemical product of natural
selection working over time on our genome, in which various decentralized resources a recruited to
attack the invaders. The system immediately identifies products in the body that are not us. The
system’s magic lies in it ability to recognize immediately invading objects that are foreign. When
“non-self” invaders appear, a systemic biochemical process springs into action as lymphocytes
recognize and bind to the molecular non-selves, targeting them for removal and destruction. The
majesty and mystery of the process is that the encroaching outsiders do not advertently pass
information to the immune system about their novel qualities; rather, our immune system recognizes
the non-self pathogenic molecules without an obvious information exchange from the invaders to the
responders. (Within the system, communication among and between neurotransmitters and hormones
regulated in the brain is instantaneous as neurons fire in nanoseconds.) In other words, the immune
system exists within us and arrives at problems ready to recognize and react against foreign
invaders. This system of selection is open-ended and pervasive; it operates within every sphere of
our lives.

And, as noted, despite our persistent primitive intuitions, within this selection system there
is no single neurobiological control center. It does not work that way. Rather, our capacities are
dispersed in a process of diffusion that often distribute normally among millions (and more) of
neuronal groups that deliver the world to and process it for us; they generate specific capacities that
generally vary along familiar standard distributions. This occurs because, like our immune system,
to survive we must continually select and develop based on our actual experiences (and dispose of

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116 For an explanation of the operation of lymphocytes, see Bruce Alberts, et al., MOLECULAR
OPERATION OF THE CELL (Garland 4th ed. 2002) available on line at

117 Edelman, BRIGHT AIR, supra note # -- at 75-9; see also id. at, at 78 (noting that the immune
system is a “recognizing system [that] first generates a diverse population of antibody molecules and then
selects ex post facto those that fit or match. It does this continually and, for the most part, adaptively.”)
Edelman won the 1972 Nobel Prize in medicine for this discovery.

118 As one researcher points out, even within a single system, such as the visual system,
dimensions like color, motion, location and object identification are processed in different areas of the

119 See Antonio Damasio, THE FEELING OF WHAT HAPPENS: BODY AND EMOTION IN THE MAKING
OF CONSCIOUSNESS 99 (Harcourt 1999) (hereafter “Damasio, FEELING”); Edelman, BRIGHT AIR, supra
note # --, at 28-9; John R. Searle, MIND, LANGUAGE AND SOCIETY 90 (Basic Books 1998); Andrew E.
This is not to say that there is not also domain specificity; there is. It is to say that along with specificity
there is dispersal so that systems operate together to bring about perception. See, e.g., Semir Zeki, THE
VISUAL IMAGE IN MIND AND BRAIN, in THE SCIENTIFIC AMERICAN BOOK OF THE BRAIN 17-28 (Scientific
American 1999).
unused exorbitant neurons throughout our childhood) so that on any day in question our cognition, our perceptions, and the processes we bring to our choices necessarily vary. To choose anything or nothing is to make a choice in this system. Two important points follow from this biological fact: First, our hard-wiring – our genotype – was formed at a time when simply surviving and passing on one’s genes to progeny were all that life required and probably as much as one could perform. Second, and at the level of phenotype, each individual makes the choices he then can effect depending on the actual circumstances and experiences he encounters.

The take-home point here is so closely aligned with our intuitions – our folk psychology – that it should not need emphasis: The actual circumstances of our lives affect both our morphology and individual development; these are indefeasible facts of human existence. Comparing our brains to our immune system “shows that genetic evolution does not invariably lead to the kind of modularity that excludes open-ended processes. Instead, it can create processes that are themselves evolutionary and therefore capable of providing new solutions to new problems.” Antonio Damasio states the crucial point that

as we develop from infancy to adulthood, the design of the brain circuitries that represent our evolving body and its interaction with the world seem to depend on the activities in which the organism engages, and on the action of the innate bioregulatory circuitries, as the latter react to such activities.

3(a) The way it works – the macro level

To this point, we have examined the jurisprudential model of human behavior, which assumes that individuals at virtually all times have the capacity to throw the “right” switch and effect the “right” decision. Like Galen’s theory of bodily humors, which retained a hold on medicine for hundreds of years after it was discredited, Descartes’ dualism – mind/body – still holds sway in much of our jurisprudence and its processes. We next looked at the operation of natural selection, which suggests the evolution has created a genomic structure that is open and ready to respond to the world.


122 Damasio, supra note # –, at 111 (emphasis in the original).

123 The information in the subsection comes primarily from the work of Susan Greenfield, a distinguished neuropharmacologist at Oxford, and Robert Sapolsky, a distinguished biologist and neurologist at Stanford. See, e.g., Susan Greenfield, THE PRIVATE LIFE OF THE BRAIN: EMOTIONS, CONSCIOUSNESS, AND THE SECRET SELF Ch. 1 (Wiley 2000); Sapolsky, supra note # –, lectures 2-5.

This next part briefly reviews the product of and the mechanisms that deliver the magic of recognition and adaptation.

It is true that our brains operate mechanistically, but that does not mean we are simple automatons. There seems to be enough play in the quantum nature of individual nerve cells to account for the ability of most people most of the time to will actions (or not). Moreover, at the macro level, we may be capable of effecting changes in the very institutions that operate in our service, and whether it is an illusion or not is unprovable – a kind of neuroscientific reaction to scientifically ill-informed apostles of faith. This section looks briefly at the operation of the nervous system, which permits us to interact with the world and learn (for good or ill) from our experience. The following section examines the mechanisms for selection in the MAOA case.

Our skulls are filled with billions of neurons that wait at rest (in “resting potential”) to be aroused, initially, by some signal(s) from the environment. When alerted, a dendritic branch – the part of a nerve cell that receives signals and initiates the brain’s internal information flow, now sufficiently aroused – sets off a chemical reaction (an “action potential”) that excites the resting neuron at its axon, a long projection covered in myelin that, so excited, carries an electrical charge to the neuron’s “axon terminal,” where connections are made to the next neuron or neuronal group(s). Once a neuron is triggered at the “axon hillock” the process of electrical transmission moves forward

A Typical Neuron

undiminished in strength until information is passed along to the next neuronal connection at the axon terminal or post-synaptic terminal.  

How neurons communicate with each other is also a vital part of this story. For all the billions of neurons in our heads, there is a tiny microscopic gap, a synapse, between each, and this gap must be traversed chemically for information to be transmitted from one neuron to the next. A variety of neurotransmitters accomplishes this feat of synaptic transmission, “the basic building block of virtually all brain operations.” These neurotransmitters, chemicals packaged in vesicles that either excite or inhibit the next neuron in the line, should fit neatly into the corresponding receptors in the next neuron. If the transmitters do not fit properly, there is likely to be a problem, sometimes a serious behavioral problem, a topic we return to shortly.

These firing neurons operate on and within relatively gross neuroanatomy. The brain is organized into at least three major systems. One, the thalamocortical system, lies deep within the brain and is connected to the cerebral cortex (or laminae, the multi-layered gray matter that envelopes most of our brain anatomy) through bi-directional input and output mechanisms. Thus, most of the neurons in this system are connected reciprocally in that they signal in both directions.

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The illustration below is from www.getrealscience.com/HartBio07/.

Greenfield, supra note # –, at 7.

Id. e.g., at Ch. 4 (discussing the impact of drug use on neurotransmission); Robert M. Sapolsky, Why Zebras Don’t Get Ulcers: The Acclaimed Guide to Stress, Stress-Related Diseases, and Coping 278-84 (Henry Holt 3d ed. 2004) (describing the neurochemistry of depression). The illustration below is from www.getrealscience.com/HartBio07/.

Edelman and Tononi, supra note # –, at 42-7.
directions (back-and-forth) so that stimulus input is grasped, organized and categorized. In a healthy individuals, these mechanisms commonly generate excitation all the way down the neuronal line.

Among the critical performance centers within this system is the prefrontal cortex or PFC and the amygdala. The PFC houses our executive functioning, that is, it is the “seat of intellection, of cognitive functioning, of personality and identity, and of emotions and thought . . . Virtually every functional part of the brain is directly interconnected to this cortex, which plays a fundamental role in internally guided behavior.” Put otherwise, the PFC guides actions “influenced by intentions, decisions, and plans that originate in the individual’s brain,” as opposed to some external source.

The image above was produced by Stephanie Seneff seneff@csail.mit.edu., Nov. 2, 2009. It is available at http://www.google.com/imgres?imgurl=http://people.csail.mit.edu/seneff/prefrontal_cortex.jpg&imgrefurl=http://people.csail.mit.edu/seneff/adhd_low_fat_diet.html&usg=__dBYLJPdNHoke-j03ljsu1rkLUp0=&h=322&w=312&sz=29&hl=en&start=1&sig2=zFz-J6YlQdniBE-anKFoWw&itbs=1&tbnid=-vONCTZHl7J2sLM:&tbnh=118&tbnw=114&prev=/images%3Fq%3Dprefrontal%2Bcortex%26hl%3Den%26safe%3Doff%3Dof%26tb%3Disch:1&ei=bIHxS9PIBsKA1AfA_7i0CA. Reprinted with permission.

For a highly readable summary of this point, see Oliver Sacks, *Inside the Executive Brain*, THE NEW YORKER, April 26, 2001, at 46 (reviewing Elkhonon Goldberg, *THE EXECUTIVE BRAIN: FRONTAL LOBES AND THE CIVILIZED MIND* (Oxford 2001) (noting that the frontal lobes are the most recently evolved – and last to be celebrated as the most important – region of the human brain)).

The PFC is also connected to centers of motor control and, importantly, it is linked with the oldest part of our brain, the brain stem, which houses our “fight or flight” response to fear. Properly functioning, it acts to suppress the more atavistic tendencies of the brain stem – this “most fundamental component” of the brain, one that “deviates relatively little in a vast range of species, from reptiles to humans.”

The PFC is thus implicated in behavior. In particular, it “sends large inhibitory projections into the limbic system, particularly the amygdala, a region heavily implicated in aggressive behavior.” A core function of PFC activation is anticipation of reward via interactions between the neurotransmitter dopamine and the PFC. These interactions can change in strength and can “take the form of an enhanced capacity to sustain dopamine release as the interval between the onset of a task and its reward increases. This would constitute the neural basis of an increasing capacity for self-discipline and gratification of postponement.” The major hypothesis today among neuroscientists who study abnormal behavior “is that in psychopathic criminals the PFC – amygdala connections are disrupted, leading to deficits in contextual fear conditioning, regret, guilt, and affect regulation.”

The second major neuroanatomical assembly operates unidirectionally; the neurons transmit “information” or signals along its length (the axons) in only one direction. It is composed of three structures: the cerebellum (mostly concerned with coordination and motor synchrony – capacities about which we do not want consistent feedback), the basal ganglia (largely responsible for planning and executing complex motor movements), and the hippocampus, which plays a crucial role in short and long term memory functions and how they are stored (a system over which we wish we had some control).

The third major system consists of a diffuse set of connections concentrated in the brainstem and hypothalamus. A key structure in directing the relationships among the many systems is the amygdala, a major player which, not surprisingly, participates in our emotional life and is constituted

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131 Greenfield, supra note # –, at 3; Sapolsky, supra note # –, at 1791.

134 Sapolsky, supra note # –, at 1791. The amygdala works with the anterior cingulate cortex (ACC), which is also “implicated in emotional self-control, conflict resolution, and error recognition.” The ACC appears to dampen strong emotions and rein in the amygdala when negative emotions arise. Tancredi, supra note # –, at 36.

135 Id. at 1791.


137 See, e.g., Greenfield, supra note # –, at 19, 67; Tancredi, supra note # –, at 36. For a review of findings implicating a role for the hippocampus and the PFC in violent crime, see Crime and Neuroscience: Neuroscience, Brain Injury, Intelligence, Child Development, Disorders and Syndromes, Psychology, Science Daily, September 13, 1997.
by a set of neurons that lie at the “crossroads, perfectly positioned for the meeting of previously unassociated inputs from different brain regions.”

As noted, the amygdala, along with the PFC, also plays a prominent role in our responses to fear-inducing situations. Among other things, the hypothalamic/brainstem region releases hormones (blood-born neurotransmitters) and other neuromodulators, chemicals that influence neural activity, including value systems, and (ultimately) human behavior.

“Value systems” are essential to our brain’s efforts to maintain reasonable homeostasis; they are in some ways the key to natural selection. These systems include the “phenotypic aspects of an organism that were selected during evolution and constrain somatic selective events, such as the synaptic changes that occur during brain development and experience.”

A value system is thus composed of those observable characteristics of our species that, in operation, define and constrain our developmental functioning. For example, think about the shape of our hands and our prehensile thumb, or the nature of our perceptual apparatuses, among many others: respectively, they provide a framework for tactile and visual possibilities. In a word, value systems make possible our ability to orchestrate our “perceptions and behavioral response[s].” Such systems are necessary preconditions to organizing our universes, but they are not sufficient alone to permit understanding.

Learning and adaptation occurs when perceptual categories and memory are linked to hedonic centers, which attach value to the categories. These centers include the usual: sexual, other appetitive functions, and our maintenance systems generally.

Learning, for good or ill, seems to occur when global maps and value centers within the brain are linked neurally. Learning “connect[s] categorization to behaviors having adaptive value under

138 Greenfield, supra note # –, at 20.

139 See generally, Joseph LeDoux, The Emotional Brain: The Mysterious Underpinnings of Emotional Life (Simon & Schuster 1996); Sapolsky, supra note # –, at 1791.

140 See, e.g., Edelman and Tononi, supra note # –, at 42-7.

141 Id. at 88.

142 Id.

143 Id.

144 Edelman, Bright Air, supra note # –, at 100. As Sapolsky points out, the limbic system is “centrally involved in emotion and the generation of emotionally related behavior.” Sapolsky, Biology and Human Behavior, supra note – at 32 (course guidebook).

145 “Mapping” is the process whereby information from receptors on the body, e.g., touch or vision, finds a point on the cortical sheets that compose the brain. These maps permit the brain to respond to a three-dimensional world “with spatial signals about pressure or wavelength differences” in the four dimensional world we live in (where time is the fourth dimension). Edelman, Bright Air,
conditions of expectancy,” where expectancy refers to places (“set points”) within those neurobiological structures that make up parts of our hedonic systems that are not yet satisfied. “Learning is achieved when the behavior leads to synaptic changes in global mappings that satisfy set points.” Memory, whether it is explicit or implicit, is “the ability to repeat a performance,” and it is, of course, key to learning. Moreover, memory is a system property that occupies different populations of neuronal groups within the brain. Unlike computers, we do not store bits of coded information awaiting the appropriate input to be spat out on command. Rather, memory operates dynamically to enhance “a previously established ability to categorize” events in different locations within the brain. This occurs by continual “recategorization,” that is, repeated rehearsals of similar information in different contexts. As Edelman and Tononi point out, “There is no prior set of determinant codes governing memory, only the previous population structures of the network, the state of value systems, and the physical acts carried our at a given moment.” Put otherwise, there are no memory algorithms. Memories arise because of “accumulations of synaptic changes in the cortex as a result of multiple restatements of the memory,” but synaptic changes alone are not sufficient either. Rather, memory is a process that requires the use of a number of circuits that produce a similar result. For that reason, memory does not “replicate an original experience.”

The importance of this fact is that our brains – and the “minds” that our brains constitute –

supra note # –, at 19.

146 Id. at 101.

147 Explicit or “declarative” memory is the stuff of concentration, that is, it occurs when “we are aware we are remembering something in the first place.” Central here is the hippocampus. Greenfield, supra note # –, at 67. Implicit or “procedural” memory – describes the effortless execution of tasks that comes from repeated practice, whereby learned sequences are organized into an “autopilot” effect. Id. at 66-7. Accord Cacioppo et al., supra note # –, at 654; Sapolsky, supra note # –, at 1790.

148 If you doubt this, simply recall the last time you were unable to remember a specific event or name or label. Suppose it is a place you have visited. You can picture the place in your mind; you can remember the people you were with at the place; you might remember where you had lunch that day and some of the other things you did, maybe what you wore, why you were there and so on. Note what we do in these circumstances: we rummage around our brains recalling a great deal about the scene and, from everything we know about memory, we are recruiting and culling data that is stored in different places. Memory is the act of pulling those pieces together to access a single name. People with Alzheimers, for example, have a harder time pulling those bits of information out of their brains than the rest of us because some of their brain functions have degenerated. See Sapolsky, Why Zebras, supra note # –, at 208-10.

149 Edelman and Tononi, supra note # –, at 98.

150 LeDoux, SYNAPTIC SELF, supra note # –, at 107.

can be changed, literally and (to some extent) at all times. As Damasio points out, we are throughout our lives, works-in-progress. Ordinary aging aside, our brains and minds can and do change in several different ways. One is through learning, a process dependent upon the environment in which one lives and the conditions to which one must adapt, again, for good or for ill. Closely related are environmental effects on our ability to control the process of neurotransmission, which can be implicated in crime.

4. The Way It Works–The Macro Level

That the environment affects human behavior, a point wholly consistent with our common observations, is a well established neuropsychological truth. A pertinent example of this phenomenon was teased out of a multitude of data by a team of neuroscientists led by Avshalom Caspi and Terri Moffitt. Caspi and Moffitt tested the hypothesis that “childhood maltreatment predisposes most strongly to adult violence among children whose MAOA is insufficient to constrain maltreatment-induced changes to neurotransmitter system.”\(^\text{152}\) (MAOA, monoamine oxidase, refers to brain enzymes that come in one of two forms, A and B. They are responsible, with other neurochemicals, for the necessary degradation of neurotransmitters after neurons have fired, thereby stopping the previous signal to permit a new signal to get through to the next neuron.\(^\text{153}\))

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\(^\text{153}\) See Sjöberg, *supra* note # – (“The MAOA metabolizes dopamine and other monoamine neurotransmitters such as serotonin that are critical in emotional responses and behavioral inhibition.”) (page sites unavailable online) (pages cites unavailable online); *Monoamine oxidase*, in SCI-TECH ENCYCLOPEDIA May 22, 2007) at http://www.answers.com/topic monoamine-oxidase. The image below is from www.getrealscience.com/HartBio07/.
Studying more than a thousand white children, over half of whom were boys at various cohorts and longitudinally, the research team discovered that boys who suffered deficits in a key neurochemical and who grew up in an abusive environment were substantially more likely to engage in violent, anti-social behavior that led to unwelcome interactions with the criminal justice system than were boys raised either with the deficit but in a reasonably healthy environment, or who were raised in a healthy environment without the MAOA deficit. Put otherwise, what the team found was that children raised in abusive environments differ significantly in the likelihood that they will engage in violent behavior, “depending upon whether or not their genotype conferred high or low levels of MAOA expression.” Interestingly, the deficit in type A monoamine oxidases does not alone conduce to later violence; it is the combination of neurochemical anomaly plus abuse in the young child’s environment that produce unwanted developmental patterns.

In subsequent work, the original researchers confirmed their earlier findings, expanded upon them, and advanced the basic notion that it is the environment that tends to produce the (mal)adaptation in light of individual differences, and not a genetic deficit alone that causes the poor behavior. This is consistent with, in fact, it is an example of the primary realization that selection is an open-ended phenomenon:

Heterogeneity of response characterizes all known environmental risk factors for psychopathology, including even the most overwhelming of traumas. Such


response heterogeneity is associated with pre-existing individual differences in temperament, personality, cognition and autonomic physiology, all of which are known to be under genetic influence. The hypothesis of genetic moderation implies that differences between individuals, originating in the DNA sequence, bring about differences between individuals in their resilience or vulnerability to the environmental causes of many pathological conditions of the mind and body.  

Although much research is necessary before these interactions are fully known, Caspi and Moffitt’s research indicates that the “gene–environment interaction approach assumes [and strongly suggests] that environmental pathogens cause disorder.” Importantly, it is we who, in many instances, control the environment.

The more general take home point here is made by Allan Gibbard. “The genetic plan for a human being will be full of contingency plans: full of schemes that in effect say ‘If A then do X, whereas if B then do Y.”

Given a difference in how two people act, it is perfectly biological to say something like this: the two people’s genetic plans [their genotypes] are the same in relevant respects. They’ve encountered, though, different cues as to their circumstances. The cues the two have encountered differ in ways for which the single genetic plan they share makes provision. The plan they share is to respond one way given one set of cues and another way given the other. The cues in question may be immediate ones, or they may be cues that came years ago in childhood and have affected the development of psychic mechanisms or the setting of parameters for them.

Raise a child in an abusive environment, a child who, through no fault of his or her own, suffers an important neurological deficit or insult, and the likelihood is significantly increased that

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157 Id.


159 Id. at 174. For example, there is rich data in the neuroscience literature indicating that early maternal rejection, physical or psychological abuse, and exposure to environmental toxins conduce to violent behavior as the child matures. See, e.g., Gary W. Evans and - Elyse Kantrowitz, Socioeconomic Status and Health: The Potential Role of Environmental Risk Exposure, 23 Ann. Rev. Pub. Health 303 (2002); Dan Orzech, Chemical Kids — Environmental Toxins and Child Development, 7 Social Work Today 37 (March/Apr 2007).
he or she will become a violent adult. But we knew that all along, just as we have known that the absence of touch and warmth in the early stages of development conduces to more violence, that child abuse generally can affect concentrations of certain cerebrospinal fluids, and that exposure to environmental toxins can produce deviant behavior – We have known all this for a very long time. Yet we refuse to move.

III. The Implications for Criminal Law of Neuroscientific Data

People who commit crimes and endanger the well being of others must be treated or confined or both. No responsible observer believes otherwise. The neuroscientist Robert Sapolsky, who argues that some individuals with PFC deficits know the difference between right and wrong and are.

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160 See also Martin H. Teicher, Scars That Won’t Heal: The Neurobiology of Child Abuse, 286 SCI. AMER. 68 (2002).


164 Also see Avshalom Caspi, et al., Neighborhood Deprivation Affects Children’s Mental Health: Environmental Risk Identified in a Genetic Design, 11 PSYCHOL. SCI. 338 (2000); Catlin M. Jones, Genetic and Environmental Influences on Criminal Behavior, available at www.personalityresearch.org/papers/jones.html; Dorothy Lewis, From Abuse to Violence: Psychophysiological Consequences of Maltreatment, J. AMER. ACAD. CHILD AND ADOLESCENT PSYCHIATRY (1992) at www.pbs.org/wgbh/pages/frontline/shows/little/readings/lewis...
nonetheless, “organically incapable of appropriately regulating their behavior,” understands as well the illogic of blaming those who suffer neurobiological deficits, but he also recognizes that this view “does not eliminate the need for forceful intervention in the face of violence or antisocial behavior.” Laurence Tancredi also notes that early childhood stress and frustration, experienced without recourse, influences human neurobiology, possibly generating permanent neurobiological changes, including lowering the threshold for stress, reducing the ability to contain violence and thus the ability to hold back – a central function of the PFC. He too stops well short of advocating that we open the prison gates, noting, for example, that fMRI data may be very useful in setting group norms in the context of brain research but is not useful for exonerating individuals in the courtroom. And Joshua Greene and Jonathan Cohen, self-described hard determinists who suggest that, in time, we may need to jettison entirely our traditional understanding of free will, nonetheless state that the law will always have practical reasons for punishing some individuals. They do predict, however, that in the future “the idea of distinguishing the truly, deeply guilty from those who are merely victims of neuronal circumstances will, we submit, seem pointless.”

The data from the brain sciences favoring some changes in our jurisprudence are compelling. The environment – that is, our own peculiar environments – can trigger genetic change and neuronal growth and/or death in a process of constant self-origination. For many years, for example, neuroscientific orthodoxy declared that adult animals of almost every sort lacked the capacity to generate new cortical neurons. That position has given way to increasingly sophisticated research showing that all primates, including human beings, have the capacity for generating new neurons well after childhood development has ended. It is now clear from research on subjects as apparently dissimilar as brainless worms and baby mice to human beings that all God’s creatures are capable of learning – No real surprise there, is there? – and that such learning is accompanied by changes in the neurobiology of all animals.

These conclusions follow, in part, from the commitment to the easy formalism that pulls us in the direction of the comfortably familiar dualism of the past, and all that its collective wisdom generally entails. What is less clear is why our law is generally unwilling to concede the fact that

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165 Sapolsky, supra note # –, at 1793-4.
166 Id. at 1794.
167 Tancredi, supra note # –, at 63.
169 Greene and Cohen, supra note # –, at 1781. Their argument is addressed in more detail infra, text accompanying notes –.
170 Ridley, Nature via Nurture, supra note # –, at 145-46.
171 Id. at 146-49.
individuals vary in their capacities for control based on deprived genetic/environment interactions, and that how we treat these individuals, given documentable deficiencies, should vary from person to person. One universal characteristic among all God’s creatures is that the laws of nature constrain what is possible for any given individual at any point in time. Criminality, and especially those forms of crime that are reflected in angry emotionally-charged, unintelligible misconduct, is in substantial measure a product of adaptation under circumstances over which the actor often has no control. As a result, not all actors have the capacity-in-fact to restrain either the occurrent desire to act out their angry feeling or the rise of those feelings in the first place. This is not to deny that such angry actors lack the capacity for intentional conduct; they too possess frontal lobes and a capacity for executive functioning. It does deny that every non-psychopathological actor who commits harmful acts in fact possesses the capacity for control. Such wrongdoers often require incapacitation and rehabilitation, but they do not necessarily deserve punishment and blame.

Our folk psychology is a wonderful resource for the successful use of practical reasoning. We could not exist without it: It tells us when to be cautious even before we fully perceive a threat, it generally permits us to make wise decisions about the people with whom we must and choose to associate; it usually permits us to decide how to allocate our time and prioritize events; and so on.

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172 See Goldberg, supra note # – passim. There is data supporting the notion that psychopaths, in particular, have well functioning logical processes; they simply cannot help themselves absent a gun to the head. See, e.g., Peter Johansson and Margaret Kerr, Psychopathy and Intelligence: A Second Look, 19 J. PERSONALITY DISORDERS 357 (2005) (finding is no difference in general intelligence between psychopaths and nonpsychopaths). http://www.atypon-link.com/doi/abs/10.1521/pedi.2005.19.4.357 (abstract); Mobbs et al., supra note # –, at 694-95 (noting that a central thesis is that “in psychopathic criminals the prefrontal–amygdala connections are disrupted, leading to deficits in contextual fear conditioning, regret, guilt, and affect regulation”) (citations omitted); Salekin et al., Psychopathy in Youth and Intelligence: An Investigation of Cleckley’s Hypothesis, 33 J. CLINICAL CHILD AND ADOLESCENT PSYCHOL. 731 (2004) (finding, inter alias that “psychopathy traits reflecting a superficial and deceitful interpersonal style were positively related to intellectual skills in the verbal realm“) http://eric.ed.gov/ERICWebPortal/custom/portlets/recordDetails/detailmini.jsp?_nfpb=true&_&ERICExtSearch_SearchValue_0=EJ683293&ERICExtSearch_SearchType_0=no&accno=EJ683293 (abstract).

173 See, e.g., Sapolsky, supra note # –, passim. (arguing that PFC damage can produce individuals who know the difference between right and wrong and are, nonetheless, “organically incapable of appropriately regulating their behavior”). Id. at 1790.

174 Here I am using the phrase “folk psychology” to describe a “theory of human psychology which is represented in the mind-brain and which underpins our everyday capacity to predict and explain the behavior of ourselves and others. On this view, folk psychology is a data structure or knowledge representation which mediates between our observations of behavior-in-circumstances and our predictions and explanations of that behavior.” Folk Psychology as Theory, STAN. ENC. PHILOS. (Rev. 2004), available online at http://plato.stanford.edu/.

175 See, e.g., Damasio, DESCARTES’ ERROR supra note # –, at 166-76 (discussing the somatic marker thesis).
There are strong emotional modules at work that inform our ability to engage in practical reasoning.\textsuperscript{176} Despite our undoubted commitment to seeking a more comprehensive understanding of the human condition, we sometimes permit predispositions to withhold the approval of new learning because some truths are hard to accept; they often appear threatening.\textsuperscript{177} For that reason, we are generally right to be skeptical of challenges to our received wisdom – skeptical both theoretically and epistemologically, where the former calls into question the implications of major changes for social order and the latter calls into question on various grounds the soundness or basis of some new scheme of beliefs or system of thought. But when the data demand a change, they should be heeded: “Social policy must adapt to a world in which everyone is different.”\textsuperscript{178}

Here, I outline the potential for neuroscience in criminal law, beginning with what it \textit{cannot} do and then moving on to what it \textit{can} do, at least at this point in time. The techniques of cognitive neuroscience and brain imaging cannot tell any fact-finder what was going on in the mind of the defendant at the time he committed a crime. Nor can we yet determine whether or not an individual – a witness, for example – is telling the truth, overstated claims to the contrary notwithstanding.\textsuperscript{179} But these techniques certainly can tell when our norms should be adjusted to account for the background of the individuals whose conduct we rightly sanction.

A. What neuroscience and behavioral genetics cannot and can do, now. A somewhat surprising and refreshing consensus is emerging in the neurosciences.\textsuperscript{180} What is noteworthy is the degree and salience of agreement among individuals who work in a variety of domains within this relatively new world of neuroscience. The agreement is reflected in an appropriately modest outlook on its current impact concerning what their science tells us about the less observable, neurobiological facets of an individual life. Most seem to agree with the late Richard Feynman’s understanding of

\footnotesize{\textsuperscript{176}By practical reasoning processes I mean simply the individual’s reasons to \textit{act} or \textit{not to act} on idea X. See Robert Audi, \textit{The Architecture of Reason: The Structure and Substance of Rationality} 4 (Oxford 2001).}

\footnotesize{\textsuperscript{177}And, of course, that is in large part what the debate is about. On the serious biases that cause us to over-blame actors, \textit{see infra} text accompanying notes —. I am pursuing this topic in depth in a manuscript tentatively titled “The Elements of Choice and Character in the Process of Blaming.”}

\footnotesize{\textsuperscript{179}Ridley, \textit{supra} note # --, at 269.}

\footnotesize{\textsuperscript{180}E.g., “Law, Mind & Brain: Interdisciplinary Colloquium” at University College London Faculty of Laws (in association with the Gruter Institute), February 13-14, 2006. \textit{See, e.g.}, Brent Garland, ed., \textit{Neuroscience and the Law: Brain, Mind, and the Scales of Justice} (Dana Press 2004).}
success in science, which emphasizes how long and hard one needs to work to gain even a tiny purchase on the workings of the universe. After describing the current limitations, I will suggest that neuroscience has a great deal to tell us now about some of the norms of our criminal justice.

(1) Limitations based on imaging. Neuroimaging permits insight in real time into the “neural structures and processes in normal and disordered thought.” How does it work? Take fMRI, functional magnetic resonance imaging, for example:

The current model of hemodynamic response posits that a transient increase in neuronal activity within a region of the brain begins consuming additional oxygen in the blood proximal to the cells but also causes local vasodilation. As a result, blood near a region of neuronal activity soon has a higher concentration of oxygenated hemoglobin than blood in locally inactive areas. The blood oxygen level dependant (BOLD) fMRI provides a measure of the hemodynamic adjustments and – by inference – the transient changes in neuronal activity in the proximal brain tissue.

To simplify, fMRI uses huge magnets (calibrated in “teslas”) to measure changes in oxygen level as blood flows into areas of the brain that are activated by some stimulus. The evidence strongly supports the idea that brain processing demands elevated levels of oxygen in the areas of the brain where the processing occurs; thus, as oxygen to any given area(s) of the brain increases, the inference of site specific activity increases. The changes are then mapped in beautiful colors on a computer

181“I have . . . found out how hard it is to get to really know something, how careful you have to be about checking your experiments, how easy it is to make mistakes,” and comparing that process to the truth-claiming statements made by some social scientists who “haven’t done the work.” From Richard Feynman on the Social Sciences, at http://mayomo.net/68362-richard-feynman-on-social-sciences.


183Cacioppo et al., supra note –, 85 J. PERSONALITY & SOCIAL PSYCHOL. at 651.


185The underlying theory of fMRI is that when neurons are active, they demand energy, which is supplied by a high energy molecule called adenosine triphosphate (ATP), which in turn is produced by oxygen and glucose in the blood. Because more oxygen is supplied to the active brain region than is consumed, the ratio of oxygenated to deoxygenated blood in the active region increases. This results in changes in magnetic resonance (MR) signal intensity, as measured by an MR scanner, because oxygenated and deoxygenated blood have different magnetic susceptibilities. The best fMRI technology today can focus on an area of the brain no larger than a grain of rice. Professor Neal Feigenson, Brain Imaging and Courtroom Evidence, in LAW, MIND & BRAIN – (ed. by Michael Freeman and Oliver
screen. What gets mapped, though, is not the brain activity itself, but an artifact of brain activity plotted by algorithms to correspond to a known area of the brain. And the displayed brain image can vary greatly “depending on the signal threshold, color, contrast, or ordinates the technician chooses or even the brand of machine available in a particular laboratory.” Moreover, images are always compared to “average” or “normal” brains and therein lie several potential difficulties: The image of any individual’s brain has to be compared to some baseline to determine if it is normal, but what is “normal” (or not) is not always clear.

As if problems related to machine intensity and determining the norms of a normal or average brain were not sufficient to cast doubt on the admissibility of fMRI displays in a single criminal case, preliminary issues related to logical relevance are also daunting. Efforts to introduce imaging evidence in the guilt phase of trial have been made in numerous cases to buttress claims of mental incompetence, insanity, and inability to deceive. Among the reasons this type of evidence is either inadmissible or not convincing is the chain of inferences that must be drawn out to support the relevance of the images.

What stands in the way? Evidence presented at trial is prima facie admissible if it has “any tendency to make the existence of any fact that is of consequence to the determination of the action more probable or less probable than it would be without the evidence.” The trial court judge makes a preliminary determination of both relevance and, as importantly, whether the evidence submitted

Goodenough (London: Ashgate Publishing 2009)).


Id. at 90.

United States v. Hammer, 404 F.Supp.2d 676, 719 (M. D. Pa. 2005) (admitting scans from multiple imaging sources and finding credible evidence that the defendant suffered significant abuse and borderline personality disorder but finding not credible, among other things, the conclusion that the defendant was not “competent and not acting voluntarily, intelligently and rationally at the time of the change of plea”).

People v. Weinstein, 591 N.Y.S.2d 715 (N.Y. Sup. 1992) (admitting evidence of brain cyst to buttress claim of insanity is murder case; negotiated settlement followed).


Fed. R. Evid. 401.
meets acceptable standards for scientific evidence. Following the Supreme Court’s 1993 Daubert decision, the federal rules of evidence were amended to state that “if (1) the [expert] testimony is based upon sufficient facts or data, (2) the testimony is the product of reliable principles and methods, and (3) the witness has applied the principles and methods reliably to the facts of the case.” Daubert requires that trial court judges gauge the reliability of proffered scientific evidence. The inquiry comes in multiple parts: 1. whether the theory or technique on which the testimony rests can be or has been tested; 2. whether the theory or technique has been subjected to peer review and publication; 3. whether the known or potential error rate of the theory or technique when applied is acceptable; and 4. whether the theory or technique has been generally accepted in the relevant scientific community.

To satisfy these standards in a case where the defendant, for example, seeks to introduce fMRI evidence to support a claim of inability to form the requisite mens rea, the court would have to find credible the chain of inferences running from the fMRI data to the psychological function or construct of interest. The chain of inferences runs like this:

\[
\text{fMRI data} \rightarrow \text{BOLD data} \rightarrow \text{neuronal activity} \rightarrow \text{psychological function}
\]

In other words, the court must begin with the assumption that area $\Omega$ of the brain is more likely to be activated in a well-functioning brain than in the defendant’s. That is to say, the first inference one must demonstrate runs from the fMRI data (the beautiful colors that are highlighted on the brain picture) to the data that demonstrates that area $\Omega$ was activated: the BOLD (blood-oxygenation level dependent) signals in regions of interest in the brain of the subject in a task condition. Next the proponent has to show the reliability of the second inference, which tracks the relationship between the BOLD signals to the neuronal activity in regions of interest in the brain of the subject in that task condition. The BOLD signal is lighting up area $\Omega$ of the brain. The third inference moves from the neuronal activity recorded in area $\Omega$ to the neuropsychological function that the proponent of the evidence is interested in, for example, area $\Omega$ is associated with the deficient mental activity and, further, that the deficit affected the ability to form the requisite culpability state at $t$, the moment the crime occurred.

Again, each one of these inferences has to satisfy the screen of reliability under the appropriate

\[\text{Fed. R. Evid. 104(a) (stating that “[p]reliminary questions concerning the qualification of a person to be a witness . . . or the admissibility of evidence shall be determined by the court”).}\]


\[\text{Fed. R. Evid. 702 (2000).}\]


\[\text{See Feigenson, supra note # –.}\]
scientific evidence standard and, in the case of inference (3) – from neuronal activity to neuropsychological function – the proponent has to satisfy the basic standard of the relevance of fMRI evidence for law, both of which are crucial considerations. Inference (1), from the fMRI data to the BOLD data in the regions of interest in the brain of subject in the task or experimental condition, is affected by the researchers’ decisions regarding, and the assumptions underlying, the data processing methods used, most of which have not yet converged on the kind of consensus that would allow the basic technology to automatically remove doubts about reliability (as have x-rays). Inference (2), from the BOLD data to neuronal activity, is less problematic but it is still potentially troublesome. Although the vast majority of brain researchers believe that local blood flow in the brain is related to neural activity, the precise relationship is not yet completely understood. And inference (3), from neuronal activity to psychological function, raises fundamental questions about the theories and concepts relied upon in the design of fMRI studies and the associations drawn between fMRI data and the cognitive or emotional function of interest.197

All but a few of even its strongest proponents understand that imaging is not mind reading. It can provide only post hoc explanations and, thus, is only one among many windows into the brain; and all imaging requires interpretation.198 That this is so follows from the chain of inferences that must be drawn and the assumptions that must be made to move from an imaging artifact to satisfying the dictates of logical relevance at trial. (And in contrast to issues of mental fitness that often arise in a criminal case, in civil cases, where the issue is often one of physical injury, the admissibility of imaging evidence along with clinical assessments presents far fewer problems.199) This is not say that neuroimaging has no current relevance in our criminal justice system, a point taken up shortly. It is to say that its use in the guilt phase of criminal proceedings is quite limited.200

B. Limitations on the use of Behavioral Genetics.

197Id. Feigenson demonstrates the potential problems that arise each step of the way.

198Mobbs et al., supra note # –, at 698.


200There is a related concern: Even if imaging technology can meet all the hurdle on the road to admissibility, Federal Rule of Evidence 403 places discretion in the hands of the trial court judge to exclude otherwise admissible evidence “if its probative value is substantially outweighed by the danger of unfair prejudice, confusion of the issues, or misleading the jury, or by considerations of undue delay, waste of time, or needless presentation of cumulative evidence.” Fed. R. Evid. 403. Virtually everyone who has worked with imaging displays has noted a phenomenon that some refer to informally as the “Christmas Tree Effect:” the tendency of observers, including jurors and judges, to be overwhelmed by the “pictures of the brain.” Mobbs et al., supra note # –, at 698. See Martha J. Farah, Emerging Ethical Issues in Neuroscience, 5 Nature Neuroscience 1123, 1127 (2002); Petit, supra note # –, at 703.
Behavioral genetics, according to one of its best known practitioners, “is the study of genetic and environmental factors that create differences among individuals.” Put otherwise and adding to the complexity that is necessary to understand both its limitations and potential, human behavioral genetics looks at “estimation[s] of variance components, that is, why people’s behavior . . . differs from one person to another.”

There are two central ideas here: “heritability,” which refers to the capacity of our genomes within a sample to pass a trait on to our progeny; and “variation,” which speaks to the contents and measures that compose the significant extent to which that capacity is influenced by random events. Although a tendency to criminality is heritable, there is no reason to believe that all of the children of criminal parents are destined to becoming criminals themselves, nor is there reason to believe that researchers will one day find a criminality gene. There is no known gene or cluster of genes that controls one’s propensity for criminal conduct. It is at least likely that were scientists to find something that partakes of a gene that induces criminality, they would find that the same genetic complex is necessary for the pursuit of useful endeavors. This is so because “genes do not work in a solitary manner; they act in concert with other genes, often with many genes.”

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203 See, e.g., Ridley, Nature via Nurture, supra note # –, at 76-7. See also Edelman, Bright Air, supra note # –, esp Chs. 5-6; Stephen J. Gould, The Flamingo’s Smile: Reflections in Natural History 326 (1985).

204 Adopted children, for example, tend to end their lives with criminal records that far more strongly resemble their biological parents’ records than those of their adoptive parents’. See, e.g., Ridley, Nature via Nurture, supra note # –, 87 (quoting Eric Turkheimer, Heritability and Biological Explanation, 105 Psychol. Rev 782 (1998)). See Plomin, supra note # –, at 108-10.

205 Plomin, supra note # –, at 108.

206 There is at least one school of thought that suggests that even if this is correct, it is “unlikely to generate practical strategies” because (a) some of the responsible genes may be relevant to useful, productive behavior; (b) levels of testosterone that conduce to aggressive behavior affect numerous brain sites, and therefore cannot by controlled sufficiently to prove useful in controlling aggression; and (c) any useful diagnostic procedures would be highly intrusive and over-inclusive. See Tabitha M. Powledge, Genetics and the Control of Crime, 46 Bioscience No. 1 (Jan. 1996), at www.aibs.org/biosciencelibrary/vol46/jan.96.crime.html (page cites unavailable).

207 Kenneth F. Schaffter, Genetic Explanations of Behavior, in Genetics and Criminal Behavior supra note # – at 79, 83. Compare Owen D. Jones, Behavioral Genetics and Crime, in Context, J. L. AND Contemp. Probs. 81, 87 (2006) (“There is no gene or set of genes (or allele or set of alleles) that are for – or directly responsible for – criminal behavior.”).
Given the interdependency of genetic and structural components of human behavior, there is reason to question the likelihood that researchers will find a direct causal link between specific genetic alleles and crimes, even though most practitioners and commentators allow that genes affect even voluntary behavior. Professor Owen Jones makes three important points in this context: One is that criminal behavior, like all of our behavior, “is influenced by both environmental and genetic forces, as well as by their interaction.” Moreover, genetic influence does not equate with genetic explanation: what behavioral genetics can do is provide some insight into why certain behaviors are more likely in one population than another. And finally, “[t]o say a behavior is natural, biological, or genetically influenced is never to say it is for that reason good or excusable, or automatically entitled to any legal deference or relevance whatsoever.” Certain individual assessments cannot be turned over to neuroscience in bulk because they require human judgment about the definitions of our norms and their application in particular cases. It is in this realm, however, that neuroscience has much to tell us.

C. The Promise of the New Genetics and Neurosciences.

Neither neuroimaging nor behavioral genetics can tell us what went on in the mind of a killer when he kills, or what his motives were. Neuroimaging fails because we commit category error if we assume “that the organization of cognitive phenomena maps in a 1:1 fashion into the organization of the underlying neural substrates. . . . [M]ost complex psychological or behavioral concepts do not map into a single center in the brain.” Behavioral genetics also fails at the level of predicting individual behavior. Put simply, the basic tools of the trade address issues in terms of population characteristics rather than individual traits. As researchers point out, studies in behavioral genetics are helpful “in quantifying the magnitude of genetic and environmental influences, albeit in a broad statistical manner through abstract variance components.” In other words, the discipline (and its cousin, behavioral ecology) produce statistical and “probabilistic information,” the stuff of which behavioral norms are created.

Although the new neurosciences are relatively indeterminate with respect to the causal


209 Jones, supra note # –, at 87.

210 John T. Cacioppo et al., supra note # –, at 654; accord Greenfield, supra note # –, at 6 (stating that “there is no one-to-one matching between a function and a particular part of the brain”); Mobbs et al., supra note # –, at 698.

211 Stephanie L. Sherman and Irwin D. Waldman, The Molecular Basis of Behavioral Traits, in Carson and Rothstein, supra note # –, at 35, 36.

relationship between a structural, genetic, or functional deficiency and specific criminal conduct on a specific occasion, the data sets have generated rich mines that address our behavioral norms. We can now ask meaningfully whether individuals who suffer psychopathy or reduced prefrontal cortex mass, or who grow up in abusive households and also suffer neurotransmitter deficits are entitled to a tailored, compassionate social response that far exceeds what we now offer.\textsuperscript{213} And if they are entitled to better treatment in light of their status as human beings and the assumption that those who cannot completely choose otherwise are, to some extent, less blameworthy than those who can, then what should we do or at least think about? Social science has made it very clear that we tend to over-blame individuals based on their poor dispositions rather than their situations.\textsuperscript{214}

(1) Examples from psychopathology and evolutionary theory – Professor Adrian Raine is among the nation’s leading researchers on the neurobiology of crime.\textsuperscript{215} His work and that of many others demonstrate that significant PFC deficits affect an individual’s propensity to commit crimes.\textsuperscript{216} Like the work on MAOA,\textsuperscript{217} Raine’s work demonstrates that genes and the environment, in combination and separately, create both their own and reciprocal risk factors for antisocial outcomes.\textsuperscript{218} Specifically, Raine has shown that poor functioning of the prefrontal cortex predisposes

\begin{itemize}
\item Neurotransmitters control the neural pathways in the brain, the “reward” centers, the abilities to feel pleasure and pain. See text accompanying notes — \textit{supra}. Studies of skin conductance among convicted criminals show that it takes longer for an electrical charge to travel down their arms, indicating a “serotonic uptake disorder.” Serotonin is the neurotransmitter that allows for the ability to reduce pain. If it is too low, the organism can get violent. If it is too high, the organism seeks stimulation. See, e.g., Amar Patel, \textit{Genetic Basis for Violence}, http://serendip.brynmawr.edu/bb/neuro/neuro04/web2/apatel.html.
\end{itemize}

\textsuperscript{214} See Theodore Y. Blumoff, \textit{The Problems with Blaming}, in Michael Freeman and Oliver Goodenough eds., \textit{Law, Mind, and Brain} Ch. 6 (London: Ashgate Publishing 2009).


\textsuperscript{217} See text accompanying notes — \textit{supra}.

\textsuperscript{218} Baker \textit{supra} note # –, at 41-42. See, e.g., Adrian Raine, et al., \textit{Interaction Between Birth Complications and Early Maternal Rejection in Predisposing Individuals to Adult Violence: Specificity to
an individual to violence in a number of ways, including loss of amygdalar control, enhanced
tendency to risk-taking, which, from the viewpoint of personality development, is associated with
impulsivity, loss of self control and an inability to inhibit behavior – all conditions which conduce
to criminal behavior.\footnote{219}

It should not be surprising that the “brains of a large sample of murders are functionally
different that those of normal people.”\footnote{220} We have known for a century or more that damage to
certain areas of the brain conduce to violent behavior. The story of Phineas Gage has been told and
retold often.\footnote{221} Yet, anyone who has ever visited a nursery in the neonate section of any hospital
knows that those six, seven and eight pound bundles of humanity were not born evil. They may have
been born with certain deficits but they had to grow into evilness. And for that development we are
all responsible.

From the perspective of evolutionary psychology, complementary findings have emerged. The
lifelong work of Martin Daly and Margo Wilson underscores the relationship between evolution and
crime. Their work indicates the presence of “evolved motivational mechanisms of all creatures,
including ourselves, . . . designed to expend the organism’s very life in the pursuit of genetic
posterity.”\footnote{222} A tendency of selection is to “facilitate behavioral choices with the best expected fitness
consequences in ancestral environments.”\footnote{223} For example, the researchers compared family homicide
rates between a parent-child relationship and a spousal relationship. They understood that the “parent
and child are genetic relatives with an indissoluble overlap in the expected fitness of marriage
partners.”\footnote{224} In contrast, any fitness overlap between spouses is “predicated on reproduction and
sexual fidelity.” And, in fact, the sources of conflict between the two relationships is very different.

\begin{itemize}
\item \emph{Serious, Early-Onset Violence,} 154 \textit{Amer. J. Psychiatry} 1265 (1997).
\item \footnote{219} Adrian Raine, \textit{Murderous Minds: Can We See the Mark of Cain?}, 1 \textit{Cerebrum} 15 (1999)
(page cites unavailable, essay available on Raine’s home page, \url{http://www-rcf.usc.edu/~raine/}).
\item \footnote{220} \textit{Id.}
\item \footnote{221} \textit{Id.}, at 64.
\item \footnote{222} Martin Daly and Margo Wilson, \textit{Homicide} 5 (Hawthorne, NY: Aldine de Gruyter 1988).
\item \footnote{223} Martin Daly and Margo Wilson, \textit{An Evolutionary Perspective on Homicide}, in M. Dwayne
Smith and Margaret A. Zahn, eds. \textit{Homicide Studies: A Sourcebook of Social Research} 60 (Sage
Publications 1999).
\item \footnote{224} \textit{Id.} at 64.
\end{itemize}
Their research, which has attempted to hold constant the confounding variable of opportunity “within household violence,” indicates a strong distinction between genetic and marital homicides: “Rates of homicide by victim-killer relationship category were vastly higher both for spouses and for other co-residing persons who were not genetic relatives than for any category of blood kin,” thus supporting the thesis that there is nepotistic discrimination in some victim-killer relationships.  

It seems as if selection has outfitted us with two competing tendencies: In some individuals, there may be a strong evolutionary tendency to commit crime as a means of maintaining fitness. At the same time, however, we seem to harbor even stronger tendencies to strike back at our tormentors. As Raine points out, “[w]hether or not there is a genetic or a biological predisposition to violence, when a violent crime is committed, we want to blame someone.” Evolution, then, has equipped us to kill to further our genetic aims but it has also equipped us with an immediate and sometimes ruthless defense to same. The task of neuroscience is to bring into the forefront a third psychological quality that evolution has provided us: compassion and forgiveness.

(2) Evidence from behavioral genetics and neuroscience. The MAOA research confirms what most of us have always known: there is a subset of violent individuals who, through no fault of their own, seem less free than the rest of us when it comes to controlling their actions, and they are less free because some genetic or neurochemical deficit, combined with a physically or sexually abusive or persistently neglectful toxic environment, produces a statistically significant greater likelihood of violence and trouble with the law. But then we have known for a long time that a child raised in

225 Id. In Evolutionary Social Psychology and Family Homicide, 242 SCIENCE 519 (1988), Daly and Wilson found that most inter-spousal homicide entailed male proprietariness, whereas the motives for most infanticide vary depending upon age, gender and other variables.

226 Raine, Murderous Minds, supra (page cites unavailable).

227 Compare John L. Mackie, Morality and the Emotions, 1 CRIM. JUSTICE ETHICS 3 (1982) (surveying that various forms retribution can take but suggesting that retributive emotions promote cooperation in the long, evolutionary, run).

228 I should certainly add that, although the data provided in this article is mostly neuroscientific, broadly defined, this new data stands on the shoulders of less technical observations. The sociology of this problem still has deep roots in our modern history. Some recent epidemiological surveys support this point. On the relationship between childhood spent in impoverished, abusive environment and health generally, see, e.g., Emalee G. Flaherty, et al., Effect of Early Childhood Adversity on Child Health, 160 ARCH. PEDIATR. ADOLESC. MED. 1232 (2006) (finding that exposure to child abuse and neglect other serious household dysfunction at ages four to six was associated with overall poor health outcomes, although there was no dose-response relationship), at http://archpedi.ama-assn.org/cgi/content/full/160/12/1232. Accord Crystal Wiggins, Emily Fenichel and Tammy Mann, Literature Review: Developmental Problems of Maltreated Children and Early Intervention Options for Maltreated Children, U.S. DEPT. H.H.S., (last revised 4/31/07), (recording studied differences in developmental, cognitive and health problems, among
an abusive environment is more likely to become abusive himself, just as we have known for a long time that “[c]riminal parents produce criminal children – yes, but [less often] if they adopt the children.” But “bad” genes as biologically “bad genes,” are generally not, like certain medications, formulated to take effect at some point in the future; “a bad environment is also required,” and vice versa! We can, with help, escape or help others escape bad environments.

And for those who cannot escape? We should understand that some individuals with organic impairments, who do not attain the level of gross and verifiable psychopathology that permits an excuse for criminal liability, really cannot stop themselves. We expect them, knowing of their malady, to mark it off and behave forever after in conformity with law. But, unlike us, they lack free will and cannot “shoulder the responsibility of keeping that organic impairment within confines of its boundaries. It cannot possibly work this way.”

What the literature about PFC shows is that there is a reductive, materialistic neurobiology to the containment, resulting in the potential for volitional control to be impaired just as unambiguously as any other brain function. It is possible to know the difference between right and wrong but, for reasons of organic impairment, to not be able to do the right thing.

Moreover, injuries to infants, for example, may preclude forever their ability to reason in a social and moral context “as though the cortical control for reward and punishment had been severely impaired.”

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230 Ridley, supra note # –, at 253 (citing the seminal work of S. A. Mednick, W. F. Gabrielli Jr, and B. Hutchings, Genetic Influences in Criminal Convictions: Evidence from an Adoption Cohort, 224 Science 891 (1984)). See Amanda R. Evansburg (Note), “But Your Honor, It’s in His Genes”: The Case for Genetic Impairments as Grounds for a Downward Departure under the Federal Sentencing Guidelines, 38 Am. Crim. L. Rev. 1565, 1574-75 (2001) (noting, per Mednick at al., that the incidence of child criminality was the highest when both biological and adoptive parents had a criminal record,” which lead the researchers to conclude that “rearing [also] has a significant effect on whether criminal behavior is manifested”).

231 Ridley, supra note # –, at 268.

232 Sapolsky, supra note # –, 1793.

233 Id. at 1793-94.
compromised, as they were not able to acquire or retrieve the knowledge that depends on the presence of reward and punishment determinations for moral reasoning."

The bottom line is that we cannot experience the world as an object of our self-conscious and non-self-conscious selves without some changes in our neuroanatomy for good and ill; that is how we are made. Experiences effect changes in, among other things, the way in which neurotransmitters, the basic stuff of communication among nerve cells, operate in conjunction with the receptors waiting to receive them. Changes in the environment, especially but emphatically not measured only by toxicity, bear upon the way we interact with the world. Ordinarily, the process by which these changes are made and, subsequently, by which memories are created, are benign or at least not harmful in the long term. But repeated instances of a harmful environment literally can alter an individual’s ability to conform to societal norms.

It is wrong, therefore, to suppose that genes alone cause crime; they do not. As noted before, there is no isomorphic correspondence between specific, unalloyed brain structures and particular behavior, notwithstanding that a handful of genetically-linked diseases might suggest a contrary understanding. “Any one function depends on the contributions of many brain areas, yet any one brain area will participate in any number of diverse functions.” At the same time, it is entirely accurate to say that individual temperament begins to be formed shortly after conception as the fetus responds to his or her environment. Raine summarizes the interdependence among genes, the environment and the tendency to criminality:

[W]hen biological and social factors are grouping variables and when antisocial behavior is the outcome, then the presence of both risk factors exponentially increases the rates of antisocial and violent behavior[, and] when social and antisocial variables are grouping variables and biological functioning is the outcome, then the social variable invariably moderates the antisocial-biology relationship such that these relationships are strongest in those from benign home backgrounds.

IV. THREE OBJECTIONS

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234 Tancredi, supra note # –, at 79. See generally Abigail A. Baird and Jonathan A. Fugelsang, *The Emergence of Consequential Thought: Evidence from Neuroscience*, 359 PHILOS. TRANS. R. SOC. LONDON 1797 (2004) (discussing behavioral and neuroscientific approaches to the ability to think counterfactually, i.e., about the consequences of one’s actions, which is at the center of the law’s approach to criminal responsibility).

235 Greenfield, supra note # –, at 6.

236 Tancredi, supra note # –, at 19.

This section addresses several commonly heard objections to the use of neuroscience in criminal law. One is that because our concept of free will is a social construction, nothing neuroscience shows us will undermine our belief in choice. A second posits that a commitment to bringing developments from the brain sciences into criminal law will require us to embrace determinism or mechanism. The third argues that the goals of many who champion the development of brain science in criminal law, utilitarian rehabilitationists, are at war with one another. Suffice it to say that these objections do not defeat the project or its goals.

A. The Critique from Compatibilism.

Among those who criticize the use of neuroscience in criminal law are those who argue that because our concept of free will is a social construction, nothing the brain sciences show us will undermine our ability to choose, and we live in a world where free choice is presumed to be available for almost everyone. In a recent article, Professor Stephen Morse argues that although the hard empirical disciplines might provide potentially relevant knowledge about human behavioral capacities, it “must fall silent about the ultimate criteria the law adopts.” This is the case because “[n]o general finding from any other discipline entails any general legal conclusion about legal responsibility unless it conclusively undermines the possibility of responsibility at all, in which case it is the basis for an external rather than an internal critique.”238 Because all legal standards are normative, he concludes, “[n]o normative differences are logically entailed by behavioral differences unless, counter-factually to reality, the behavioral differences precisely track the normative differences.”239

Morse elaborates on the distinction between critiques internal and external to law. As to the former, he hypothesizes two relatively narrow classes of case, one dealing with neuroscientific evidence of something like automatism and the other evidence of brain damage; in both cases such evidence might assist a fact-finder. Although in both cases the evidence does track a specific legal standard, neither class is likely to change law beyond the odd case in which the evidence was relevant.240 So far so good. He then moves to the external critique of legal standards. He rightly rejects the likelihood that neuroscience will demonstrate that we are all automatons, that intentional brain states are themselves nonexistent. Morse aligns this position with eliminative materialism, the position that our common sense psychology is radically wrong, “that mental notions like belief or sensation could simply be abandoned in favor of a more accurate physiological account.”241 He then


239Id.

240As noted earlier, court are already admitting imaging evidence of brain damage. See note – supra.

241Eliminative Materialism, STAN. ENCYC. PHLOS., available on line at http://plato.stanford.edu/entries/materialism-eliminative/ (citing W.V.O. Quine for this idea).
gives his full embrace to compatibilism, rejecting incompatibilism, which he describes as the idea that no one “can be genuinely responsible because neuroscience and other disciplines conclusively demonstrate that all our actions are mechanistically determined and determinism (or universal causation or some such) is incompatible with ultimate responsibility.”242 From Morse’s perspective, those who challenge compatibilism fal into their own trap: To sustain their position, he argues, they are required to abandon the notion of responsibility for anyone at any time and accept that determinism “is not selective or partial.”243

On these notions Professor Morse seems to join hands with Professor Michael Moore, who thoroughly rejects the commonsense idea that determinism might exist in degrees.244 Strongly taking issue with a psychologist who argues that the feeble-minded lack the freedom of action and choice of a psychopath who lacks the freedom of action and choice that an “‘average, reasonable’ or ‘prudent’ abstract standard man of the law,” Moore writes:

[T]o speak of being partly determined or partly free makes as much sense as to speak of being partly pregnant. To be sure, we can make comparative judgments that one cause is more important than another in producing behavior. Indeed, there is quite a body of literature on the criteria we use in determining which conditions are more causally relevant than others in various contexts. But none of this literature can make sense of the quite different comparative judgment about the relative importance of all causes on the one hand, and of freedom on the other. For the degree determinist, it has to be sensible to ask: how much causation was there? The problem is that such a question seems to make no sense at all.245

Once again, given the free will construct, which is apparently immutable, we have an either-or situation; like Morse, one cannot abandon the idea of free will unless doing so “conclusively undermines the possibility of responsibility at all.”

Moore’s argument is in at least one sense more vulnerable than Professor Morse’s. Moore’s analogy to pregnancy, perhaps meant as a flippant aside, is nonetheless absurd on its face. Likening being partially determined and partially free to being “partly pregnant” attempts to compare a capacity for free action, a metaphysical construct which even Kant ultimately could not fully warrant,246 to a

242 Morse, supra note # –, at 402.

243 Id. (emphasis added).

244 Michael S. Moore, Causation and the Excuses, 73 CAL. L. REV. 1091, 1114-16 (1985).

245 Id at 1115.

246 In his monumental effort to defend free will, Kant ultimately defends freedom normatively in the face of physical necessity: “[T]o argue away freed is as impossible for the most abstruse philosophy as it is for the most ordinary human reason. Reason must therefore suppose that no genuine contradiction
demonstrable physical condition. The analogy is thus utterly flawed. We do not usually ask the jury to determine whether \( A \) is or is not pregnant. If the question arises as an issue in a case, its answer is determinate. Absent extraordinary conditions, she either is or is not pregnant; there are ample testing regimens and (with time) visual proof available beyond any doubt by anyone that \( A \) is or is not pregnant. But to suggest that the average non-psychopathological individual enjoys the same freedom of action as the feeble-minded is simply silly. Caspi and Moffitt’s work with MAOA makes this point emphatically. Moore’s dis-analogy fails to distinguish between legal responsibility – freedom of choice – and a factual condition – pregnant or not. Legally, we demand a finding. For example, in a proper case we might ask, Was \( D \) under duress or not under duress at time \( t \)? We assign a burden of proof to this question, and the need to make such an assignment, standing alone, suggests that people may be uncertain about how much control \( D \) had.\(^{247}\)

Second, Morse and Moore continually use the term “causation” interchangeably with the term “determinism,” but doing so ignores the fact that when freedom of action issues arise in a proper case, the fact-finder is required to make a probabilistic determination about the mental state of the defendant: Based on the evidence presented, did this actor, beyond a reasonable doubt (or according to some lesser probabilistic standard) – fill in the blank: have the requisite capacity, show the amount of resistance that a reasonable person would show, suffer diminished capacity, lose control of his emotions, and so on? These questions assume some amount of what Moore has dismissed as “degree determinism.” The major point is that these issues are not binary. Although it is true that each juror, in the end, exercises a single “yes” or “no” vote on the question, the dynamics of the jury room in reaching one decision or an other – argument, struggle, negotiation over each charge brought and the ultimate decisions reached – suggest a system that understands the nuance of partial determinism.

But the most important point here is one that Moore and Morse overlook or unnecessarily discount. When issues of responsibility arise in the course of ordinary litigation we have some reason to question the actual intellectual and/or volitional capacity of the individual who faces incarceration or even death. By dismissing the idea that different individuals raised in different environments have different levels of capacity, and that the law might take cognizance of that undeniable fact in one way or another, they beg the essential question that the new findings from neuroscience deliver. On virtually every measure one can think of, our capacities, including the capacity to make socially acceptable choices, are distributed among us in standard fashion.\(^{248}\)

\(^{247}\)It is, of course, the case that one who acts under duress must be able to make a choice, else the compulsion cannot work. See, e.g., my The Neuropsychology of Justifications and Excuses: Some Cases from Self-Defense, Duress, and Provocation, 50 Jurimetrics – (Forthcoming, 2010). But that truly is beside the point because we act as if the defendant had no free will..

\(^{248}\)See, e.g., Plomin, note –, supra.
The law can take account of this fact, not in its substantive domain, but in its punishment system, by taking seriously – rather than paying lip service to – the exhortation to consider rehabilitative and therapeutic measures. As previously noted, the Model Penal Code’s division of mens rea into four categories constitutes implicit (but only) partial recognition of the way in which our control functions actually operate – on a continuum. That courts take the rejection of a binary approach seriously is necessary because the drafters take the firm position generally that “questions about determinism and free will” have no place in its description of substantive crimes. Rather, the Code’s comments state that courts should take degree determinism into account in the sentencing phase of trial.

Finally, their arguments are, in effect, extended tautologies. If determinism is not “selective or partial,” as Morse puts it, or if partial determinism “makes as much sense as to speak of being partly pregnant,” as Moore has it, then one begins the argument with an understanding of free will that rejects anything other than full-throated compatibilism in all but the most psychopathologically defective individuals, who are treated as if they have no free will. In their telling, the only possible conclusion is that uncompromising compatibilism is, and partial determinism never is, consistent with free will, so defined. Neither seems fully open to evidence, which may not be a surprising conclusion given that both are also psychologists who practice in a discipline that seems focused mostly on those problems that neurologists and neuroscientists are working to explain empirically.

All of this suggests that there is some sort of odd, implicit dualism at work wherein one can concede material causes all the way down and assume that there is a sharp causal break between our brain processes and our belief in a free will. How can those apparently inconsistent views be reconciled? I am not certain I can answer this question but I do think we can at least lay out some of the possibilities. Either we really do not (or should not) believe in this epistemic break but remaining unwilling to refine all the processing necessary to bring our punishment practices in line with the reality of a causal scheme that exists on a continuum from less to more capable of possessing and of exercising our choice-deliberative capacities. Or, perhaps, we do not believe in the break but are convinced that we have already achieved as much as we can to help those less fortunate than ourselves; we are content with the settled understanding. (After all, belief in free will goes back at

249 See note —, supra.

250 Id. cmt to § 2.01, at 215 (1985) (requiring a voluntary act).

251 Professor Morse’s conclusions follow because he assumes, as most of us do, that “free will is a social construction.” Its details are often socially constructed and so forever open to criticism and change. But that truism raises a different, more fundamental question, namely, is there a core to the idea of free will that is, in fact, a part of human nature? This is not the place to answer such a difficult question but it is worth noting that the belief in individual free will is universal, that it plainly has adaptive qualities, and that it is functional as well as ideal.
least to Hebrew Scriptures.\textsuperscript{252} Or, we do believe there is a divide but have to concede that, epistemologically, this is the best we can do by way of articulation and so we continue to move “as if” we can justify our belief in free will. Or, finally, we are driven by ideology or belief of one sort or another to trust in extra-causal forces in the world.

B. The Critique from Determinism.

Are we then committed to full-fledged determinism? It is undeniable that the brain operates in a deterministic way. When an axon receives sufficient dendritic chemical excitation to begin the electrical charge that permits one of the billions of neurons in the human brain to communicate with other neurons and neuronal groups, the process is undeniably deterministic: an “action potential” – the description of the stuff that drives neuronal communication – begins; it maintains its charge over space and time until it transmits information to other neurons.\textsuperscript{253} But the materialistic nature of brain processing does not necessarily translate into determinist behavior, at least for most of us most of the time. We have, or must assume we have, some control.\textsuperscript{254}

Not everyone agrees. Joshua Greene and Jonathan Cohen, for example, peer into the future of neuroscience and rightly find hopeful signs.\textsuperscript{255} They realize that law is empirical but it is always potentially normative too and that the normative components of law can accommodate emerging scientific knowledge that will effect changes to our moral intuitions and our moral psychology. Greene and Cohen reasonably gauge that those who predict that neuroscientific discoveries will effect

\textsuperscript{252} “Behold, I set before you this day a blessing and a curse’ (Deut. xi. 26) Why is it stated this way, since it has likewise been said, “See, I have set before thee this day life and good, death and evil” (Deut. xxx.15)?” See Abraham Cohen, EVERYMAN’S TALMUD: THE MAJOR TEACHINGS OF THE RABBINIC SAGES 93 (Schocken Books 1995 ed.).

\textsuperscript{253} For a highly accessible and entertaining introduction to this subject, I recommend Robert Sapolsky’s series of lectures, BIOLOGY AND HUMAN BEHAVIOR: THE NEUROLOGICAL ORIGINS OF INDIVIDUALITY (The Learning Company, 2d ed. 2005).

\textsuperscript{254} “[T]o argue away freedom is as impossible for the most abstruse philosophy as it is for the most ordinary human reason. Reason must therefore suppose that no genuine contradiction is be found between the freedom and the natural necessity ascribed to the very same human actions.” Kant, GROUNDWORK, supra note # –, at 116. The section to which the text refers is titled “On the Extreme Limits of All Practical Philosophy.” He begins the section by acknowledging that “freedom is only an Idea of Reason whose objective reality is in itself questionable, nature is a concept of the understanding, which proves, and must necessarily prove its reality in examples of experience.” \textit{Id.}

no major changes in law are half right. The jurisprudential component of our law is incredibly rich; it is capable of embracing nuances of semantics and moral theory along with epistemology, theology, social and economic developments. Greene and Cohen are also on point when they write that this movement should, over some period of time, shift us away from retribution toward a compassionate consequentialism, which by its nature calculates the benefits of new information, including scientific knowledge, in its cost-benefit mix. (Hence legislators purport to use some version of aggregate utility routinely.) As we learn more about the distribution of normatively preferred cognitive and volitional capacities, with the understanding that some members of society not now deemed grossly psychopathologically deficient are nonetheless incapable of meeting our standards, we will soften our approach to criminal liability and sentencing. My disagreement with their ideas then is small but it bears directly on any discussion about neurobiological essentialism, a position that is unwarranted.

My concern stems from a biological claim they make which is both unnecessary and for which we simply do not have enough data. This uneasiness stems from their “fantastical” description of a future reality made possible by neuroscience. Greene and Cohen begin by imagining an internal mental struggle over a mundane choice, “Soup or a salad for lunch today?” They hypothesize a neuronal convergence – a “tipping-point moment” – the identification of which will permit experts to isolate the precise neural circuits in conflict, color code them for inspection by means of a future, readily available incarnation of fMRI, and then map the precise millisecond that corresponds to our articulated choice. That tipping point moment, they assert, will reflect the cause of the choice we make. In their narrative future, the blue-dyed neurons defeat the red-dyed neurons and cause this lunch-bound person to choose A over B, salad over soup. Because our neurons forced our choices, and because the reigning commitment to compatibilism insists on a choice to do otherwise as a necessary condition for sufficient autonomy and rationality to attribute fault, there can be no blameworthiness. Determinism wins.

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258 Whether they actually are moved by aggregate utility is, of course, another question altogether. See, e.g., Richard Posner, What Has Pragmatism to Offer Law?, 63 S. Cal. L. Rev. 1653, 1665 (1990) (noting that social choice theory underscores the difficulties with aggregating preferences and that interest-group theories suggest that legislatures often do the bidding of narrow interest groups).

259 There is a phenomenon lawyers describe as concurrent or multiple causation and philosophers describe as causal over-determination: a situation in which multiple causative agencies produce the same indivisible harm. In theory, this leaves us unclear whether or not choice is a necessary condition for free action. The seminal work in this area is that of Harry G. Frankfurt. See, e.g., Frankfurt’s Three Concepts of Free Action: II, in Moral Responsibility 113 (ed. by John M. Fischer; Cornell U. Press 1986) (originally published in 49 Proc. Arist. Soc’y. 113 (supp. 1975)). Examples and an explanation of the phenomenon of over-determined events are contained in Fischer, Introduction, in Moral Responsibility, supra at 9, 40-51. See also Donald Davidson, Freedom to Act, in Actions, Reasons, and...
This outlook on potential developments gives too much ground to a view of science that instantiates a radically disengaged materialism, a neurobiological essentialism according to which everything – *everything* – is neurobiologically determined: Free will is illusory, at most an epiphenomenon born of our neurobiological processes. The available neurobiological research data may permit this viewpoint but they certainly do not require it. What the authors have done, I think, is to reason in a *post hoc* fashion, which (as is often the case) contains an enticing kernel of truth. I have a different view of our future social epistemology than they, and I think we can and will corral this unnecessary essentialist tendency.

Their error, I think, is one of reasoning from a proposed real time neuronal snapshot backwards (yes, backwards) to a necessary causal explanation therefor. I think the reality of cognitive processing suggests that we cannot fully uncover the “Truth” of our own choices. As explained earlier, our neuronal processing does not work as quickly as they hypothesize; there will always be multiple gaps between neuronal processing and the actions that follow. But before I explain that point, let me set the table a bit further by putting this quarrel into the narrower jurisprudential context of punishment theory, which they describe accurately. For I mostly agree with the prescriptive inference they draw from data that we all find hopeful and exciting.

Greene and Cohen are on solid ground when they predict that the important question we should ask as we make judgments about the blameworthiness of others is not the simplistic question – “Is he rational?” – though many remain wedded to this settled view. As I suggested earlier, this question has little meaning under the current descriptions of what constitutes decision-making capacity, namely, the ability to effect a simple syllogism. It’s not a simple question of “Who did this?” either. Rather, the important question is the one that Alan Gibbard asks. To avoid the non-productive responses that often promote and follow retributive action – “Who did it so we can heap

_Causes_, in _Essays on Actions & Events_ 63 (Oxford 1980). Professor Bok rightly questions how deeply one should take Frankfurt’s very clever thought experiments into account for practical reasoning, precisely because their cleverness tends to undermine their relevance to actually occurrent causative instances. Hilary Bok, _Freedom and Responsibility_ 20 (Princeton 1998).

260 For a broad philosophical review and refutation of this position, see John R. Searle, _Mind: A Brief Introduction_ Chs. 2-3 (Oxford 2004).

261 How we might govern ourselves under such a regime is obviously problematic; and the politics of such a forlorn situation, in which only the scientific elect are in the know, is a chilling idea that the data do not now support. It should be noted that their forecast appears as almost a bit of whimsy following a discussion about a routine philosophers’ debate over the culpability (or lack thereof) of “Puppet” killer, a man who has been precisely programmed to kill fellow humans by a neuro-programmer with a 95% success rate.


263 See note – _supra_.

Page 61 of 78
deserved blame on him as the target of our ire?264 – we need to ask questions that include crucial biographical elements: “Who is the person who did this wicked thing?” This is the question we routinely ask in only two contexts in our jurisprudence: juvenile proceedings and pre-sentencing hearings in death penalty cases.265

On the issue blameworthiness, the contrast between the agendas of retributivists and utilitarian pragmatists is quite clear. Retributivists of all stripes are interested in answering one basic question: “Is he a criminal who deserves what he might be getting?”266 This question generally embodies an untenable view of the composition of cognitive and volitional competency. (And, on its own terms, it assumes that we can make even reasonably determinate allocations of fault based on “deserved” punishment.267) Instead, in every case of wrongdoing the compassionate utilitarians ask more elucidating questions up front: “What combination of genetic and environmental factors came together such that this wrongdoer has become what he is now? How did he get here?” “What can we do to make things better for us and him?” As Greene and Cohen note, the “he” in this question deserves our genuine interest even if, when necessary, we segregate him from society. These richer more hopeful and merciful questions recognize implicitly that each of us is in fact the product of the singular mixture of genes and environment – G ×E – that determines who we are. And when we recognize and accept this as the basis of a humane social policy for the entire body politic, we cannot help but realize: “There but for the grace of God go I.”268 Compassion follows.

Many of those who argue that we will eventually come to an understanding that there are nothing but causes all the way down, and so we really are mechanistic individuals, rests on the research of Benjamin Libet, whose works appears to dispute the conventional wisdom by challenging the major premise that begins the simple, practical syllogism that explains “free will.” From a naive perspective, free will is executed when the conscious I decides it commences, and not before. I am

264 On the well studied tendency to over-attribute blameworthiness to character rather than situation, see, e.g., Mark D. Alicke, Culpable Control and the Psychology of Blame, 126 PSYCHOL. BULL. 126 (2000); Jonathan Haidt and Jonathan Baron, Social Roles and the Moral Judgement of Acts and Omissions, 26 EUROPEAN J. SOC. PSYCH 201 (1996). I have addressed this point in The Problems with Blaming, mss to be published by the Faculty of Laws, University College London.

265 As to the former, the rush to push juveniles into the adult criminal system is, at best, a questionable practice. See Peter Ash, Adolescents in Adult Court: Does the Punishment Fit the Crime?, 34 J. AMER. ACAD. PSYCHIATRY L. 145, 148 (2006) (arguing that this movement reflects a “distorted view of adolescence”).

266 On the commonalities among all retributivists see, e.g., Mackie, supra note # – at 4 (surveying the various form of retribution); Jami L. Anderson, Annulment Retributivism: A Hegelian Theory of Punishment, 5 LEGAL THEORY 363 (1999).


268 See Gary Watson, Responsibility and the Limits of Evil, in RESPONSIBILITY, CHARACTER, AND THE EMOTIONS 265, 276-77 (ed. by Ferdinand Schoeman; Cambridge 1987).
in control: “I desire (or not) to reach a goal, I believe based on accessible knowledge, and I then act based on my choice.” No one doubts that “we experience something like free will. The experience is not the question; the question are: what does this experience entail?” And who shares this experience? Libet’s work tells us that, at least under some circumstances, “freely willed” actions do not seem to operate consistently with our intuitions for among the many findings Libet’s team of researchers discovered is that subjects begin to make “freely-chosen” movements before they report awareness of that movement.

What does that mean? Certainly Libet has shown at the very least that we do not – and cannot – access all of our motives. Perhaps the only determinate response we can make to Libet’s work is that one cannot claim surprise that some mental processing occurs before an individual makes

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269 For the view that this perspective is epistemologically incoherent, see, e.g., Nagel, Nowhere, supra note #—, at 120 (“To praise or blame is not to judge merely that what happened was a good or bad thing, but to judge the person for having done it, in view of the circumstances under which it was done. The difficulty is to explain how this is possible.”); Galen Strawson, Consciousness, Free Will, and the Unimportance of Determinism, 32 Inquiry 3, 10 (1989) (stating that “to be truly deserving of praise or blame for our actions, . . . we must be truly responsible for how we are mentally [for our intentions;] and doubting that such circumstances are possible).


271 This story is told in Gazzaniga, supra note #—, at 69-70. Libet’s work as neurologist led him to ask how much time transpires between the onset of the cortical stimulation and our articulable conscious awareness of that stimulation? Benjamin Libet, Do We Have Free Will, in The Volitional Brain: Towards a Neuroscience of Free Will 49 (Benjamin Libet, Anthony Freeman & Keith Sutherland, eds.; Imprint Academic, 1999); Gazzaniga, supra at 70; Edelman and Tononi, supra note #—, at 68; Huntley Ingalls, Consciousness as a Valid Subject for Scientific Investigation, Skeptical Inquirer, Sept. 19, 1995, at 22 (page cites unavailable on line). It seemed as if we process the world. His curiosity piqued, Libet asked a second question: Do the phenomena we perceive as a “voluntary” begin with a conscious determination to act? His interest was shared with others. Libet was familiar with earlier research which discovered that an electrical change in the scalp—a “readiness potential” (“RP”)—precedes the performance of “self-paced” voluntary acts by up to one full second. Hans Kornhuber and Luder Deecke, Hirnpotentialanderungen bei Willkurbewegungen und Passiven Bewegungen des Menschen: Bereitschaftspotential und Reafferente Potentiale, 284 Pfluegers Arch Gesamte Physiol Menschen Tierre 1 (1985) (reported by Libet, supra note #—, at 49). RP refers to “a specific event-related potential” – neuro-chemical reactions – recorded on the human scalp” that precedes motor activity. Edelman and Tononi, supra note #—, at 69. Libet and his research team have tested this finding. Libet’s research process is also described and summarized by the distinguished cognitive neuroscientist Gilberto Gomes, Volition and the Readiness Potential, in The Volitional Brain supra note #—, at 59.

272 There is a lively, ongoing debate among serious scholars on the meaning of Libet’s work. Simply Google “Benjamin Libet” to enter the conversation. (Last entered on August 4, 2008.)
an apparently freely chosen decision to raise one’s arm while staring at a clock.\textsuperscript{273} For those who genuinely reject dualism, Libet’s data are not troublesome: Where, if not somewhere in the recesses of our neurobiological processing, would the impulse to raise one’s arm come from? Dualists might have an answer for this question but empiricists do not. Whether the movement was “freely” or “capriciously” willed might cause us to challenge the standard model of free will because some neurological processing preceded volition, but Libet’s subjects were already primed to make a movement at some point in time. One might conclude simply that the readiness potential that precedes their caprice serves to kick-start whimsy rather than free will.

And this last point brings us full circle back to Greene and Cohen. How do we come to choose the salad rather than the soup? The basic framework for moving from desire to action runs in five (or many more) steps.\textsuperscript{274} We move from (i) desire, which arises from somewhere, a conscious intention, for example, to obtain food or money or sexual fulfillment: “I want X;” to (ii) desirable passion (an occurrent psychological state in which we distinguish between the desirable and the desired); to (iii) belief centers activated (value centers triggered); to (iv) belief engaged: commands are sent to our hedonic and motor (value) centers, which are now fully involved; to (v) act (and will). The commands for movement are sent from our internal images and plans to our hands to pick up the salad. In all of this there is uncertainty and, as noted earlier, gaps.

In Greene and Cohen’s envisaging, we can close the gap completely between neuronal firing and action, between “true” neurological-material cause and observed effect, and here they run into

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\textsuperscript{273}In 1983, Libet asked subjects to report the time they first became aware of the urge to act. Libet, et al., \textit{Time of Conscious Intention to Act in Relation Onset of Cerebral Activity (Readiness Potential)},” 106 \textit{Brain} 623 (1983). He used a clock whose dial was divided into 40 msec units. For each group of subjects put through 40 trials, the onset of cerebral activity preceded “voluntary” muscle movement by an average of 550 msec. The subjects first became aware of the wish to move their wrists about 350 msec later (about \(\frac{1}{2}\) second), and 200 msec before muscle movement. (These figure remained consistent even when the subjects reported some preplanning before the muscle movement.) Correcting for timing biases, the results indicated that the subjects’ brain processing, RP, began approximately 400 msec before the appearance of a conscious will to move, and 150 msec between RP and awareness. \textit{Do We Have Free Will?}, in \textit{The Volitional Brain}, supra note \# –, at 50-1. As Libet notes, the actual pre-awareness processing probably begins earlier in an unknown area that activates the supplementary motor area of the cerebral cortex. \textit{Id.} at 51. In sum, the standard, folk-psychological model Moore describes – and which whose accuracy we all tend to take for granted – is questionable.

\textsuperscript{274}In fact, the phenomenology of choice can be described in any number of steps. The basic paradigm used here is from Moore, \textit{Metaphysical Sources}, supra, note \# --, at 19-20. He would doubtless disagree with how I am using it

trouble. On their view, the nature of neuroscience as a factor in our social epistemology – those “common sense background thoughts” we take as given – is to push ever outward toward pure mechanism. That conclusion is not empirically clear and it is certainly not necessary; and if it is neither clear nor necessary, then those of us who are committed to a more compassionate view of human behavior should not encourage it. The alternative view, which also comports with neuroscience, suggests that some of us, by virtue of our own actual environments, are freer than others.

We do not now know how to fill the many gaps between (i) the initial thought about possible future action and the decision to follow through with it and (v) the point of action and, for example, pulling the trigger that kills an innocent victim. Importantly, there is no “real time” picture of the decision-making process; as noted earlier, there are only constructed artifacts. Although the work of Benjamin Libet purports to tell us that there is roughly a 350 msec. break between the immediate decision to pull the trigger and the pull. All such gaps are among the necessary components of causation, and we still have to intuit what fills these gaps and, more importantly, what may transform the neuronal firings that produced the idea into the neuronal firings that sustained the idea to the moment of action and, finally, into the neurons that took over as our decision is verbalized and acted upon: “The salad, please.” Libet has suggested, not without fully acknowledging the problematic nature of his conclusion, that our neurobiological decision-making processes retain a veto after action is triggered but before it occurs. Without entering into this debate, one can conclude that some people have some choice, at least some of the time.

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276 Much of what follows in the text is from John R. Searle, RATIONALITY IN ACTION Ch. 3, (New York: M.I.T 2001).

277 For full-fledged challenge to Libet’s timing, see Alfred Mele, EFFECTIVE INTENTIONS: THE POWER OF CONSCIOUS WILL, esp. Chs. 3-4 (Oxford University Press 2009).

278 Although Libet’s explanation creates its own timing, when one watches the golfer Tiger Woods stop his swing on the downswing for a masterful exhibition, the idea of a veto capacity has some visual support. See, e.g., Benjamin Libet, Unconscious Cerebral Initiative and the Role of Conscious Will in Voluntary Action, 8 BEHAVIORAL & BRAIN SCI. 529 (1985); The Timing of Subjective Experience, 12 BEHAVIORAL & BRAIN SCI. 183 (1989).

279 For an approach consistent with the one taken here, see the work of Gilberto Gomes. Gomes, in THE VOLITIONAL BRAIN supra note # –, at 60 (approaching the question of free will from a neo-Kantian perspective, distinguishing between first person and third person standpoints on free will). When an actor feels subjectively as if she determined her acts by virtue of a conscious decision (where “conscious” describes an internal state according to which we attend to a choice neurobiologically before we make it), Gomes describes the experience from a first person perspective. Id. Based on appearances, he also affirms that we can judge the actions of another as voluntary from a third person perspective; given the appropriate evidence, we come to believe that the actor determined her own conscious decision. This distinction is necessary for Gomes to address our perception that the voluntariness of our own actions seems to conflict with causal determinism. Choice, he asserts, implies the ability to do otherwise. We know, according to quantum theory, however, that the classical view of
The important point is that nothing about the basics of neuroscience that influence law’s model of human behavior for the better has to lead to a brand of radical reductionism that is unencumbered by genuine individual choice when such is available. Reasonably imaginative and foreseeable neuroscientific data may have some capacity to put our folk psychological intuitions on a collision course with our physicalist intuitions and that potential could affect our moral and legal intuitions for the better. There is a kind of retrospective magic to making good decisions when they are necessary; but, of course, that is part of moral luck too. The gift of good and reasoned decision-making is also a product of genes and environment. Some of us have been lucky. We should be held accountable.

C. The Critique of Inconsistent Goals

At least one sympathetic critic of the brain sciences fears that the long term goal of many neuroscientists working with criminal defense counsel cannot be reached because the short term goal – helping individuals with some kinds of brain deficit avoid lethal injection – is at war with the long term goal of bringing serious rehabilitation back into the criminal justice system. In *Neuroimaging and the “Complexity” of Capital Punishment*, Professor Snead argues that the two goals are inconsistent and cannot bring a regime of compassionate rehabilitation to criminal law generally. This is bound to occur, he argues, because the short term goal of cognitive neuroscience in the death penalty context is using “cutting edge neuroimaging research [to] demonstrate[] a biological disposition to criminal violence.” Courts have permitted defense counsel to introduce this evidence in mitigation, hoping to convince the jurors that defendants convicted of murder in death penalty physical theory is inaccurate, at least at the quantum level. Events at that level are probabilistic and hence undetermined. See, e.g., Schwartz and Begley, *supra* note # –, at 268-84. Moreover, at this level random events can serve as causal initiators. These observations, however, do not implicate our first person view of the world. Gomes, *supra* at 60. Dualism provides one way out of this dilemma by uncoupling the mind from the body, but Gomes rightly rejects it for most of the reasons suggested earlier.

Moreover, whereas some philosophers analyze the question of what the phrase “free will” means in the statement “I have free will,” Gomes asks what composes the “I” in the same statement. If we define I to include this partially non-conscious decision system – that is, one in which consciousness is absent at the onset of the decision process – the actions that follow are, in Gomes’ view, determined by ourselves: “It is when we consider our self to be pure spontaneity – a being that is not subject to causality – that we are in illusion.” Gomes, *supra* note # –, at 62. In this account, the choosing I includes parts of the brain’s information processing system that begin to function before we are conscious of it; his account thus avoids the question of whether or not we possess initiating conscious control. The crucial processing seems to reflect the appearance (some milliseconds in time) of internal representations guided by neuro-criteria of which we are not fully conscious. On Gomes’ view, we could hypothesize that free will includes activity of the brain system, namely, structures that begin to fire just prior to awareness.

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280 Snead, *supra* note # –.

281 *Id.* at 1299.
cases, for reasons of neurobiology, are not as blameworthy as jurors might otherwise think. And if that is the case, then the defendants are not as worthy of maximum retribution – i.e., the death penalty – as the prosecution declares. This was a part of the “winning” rationale in the \textit{Roper} decision, when a majority of the Supreme Court recognized that adolescent brain development simply did not warrant the death penalty because adolescents are not sufficiently mature to check their impulsivity.\footnote{\textit{Roper} v. Simmons, 543 U.S. 551, 569 (2005). This was a point hammered home by the American Medical Association in its Amicus Brief in \textit{Roper} (No. 03-633) (co-signed by a number of professional medical associations), 2004 WL 1633549.}

But the long term goal of at least some neuroscientists is to overthrow retribution entirely and, in its place, install a regime of rehabilitative, therapeutic justice for the humane treatment of criminals.\footnote{Sned \textit{supra} note # --, at 1309. \textit{See}, e.g., Greene and Cohen, \textit{supra} note --, at 1786-87; Jeffrey L. Kirchmeier, \textit{A Tear in the Eye of the Law: Mitigating Factors and the Progression Toward a Disease Theory of Criminal Law}, 83 Or. L. REV. 631 (2004) (arguing for an abandonment of retributive theories of punishment in favor of a disease approach); Sapolsky, \textit{supra} note # --, at 1793-4.} From Snead’s perspective, these two goals are irreconcilable because one cannot achieve a “radical conceptual revision of criminal punishment itself” with a purely forward-looking punishment rationale and at the same time rely upon backward-looking retributive rationale to meet short term goals.\footnote{Snead \textit{supra} note # --, at 1309.} Snead argues, with some plausibility, that “the success of the long-term goal would necessarily defeat the project’s short term goal. . . . [because] it is only by virtue of just deserts that neuroimaging evidence of the roots of criminal violence can be understood at reducing a capital defendant’s culpability.”\footnote{\textit{Id}. at 1319.}

Snead is right to highlight the double-edged nature of the sword that uses evidence of neurobiological deficits to avoid the death penalty. In \textit{Roper}, for example, the case in which the Supreme Court held, based in part of neurobiological evidence, that imposing capital punishment for a murder committed by a juvenile violated the Eighth Amendment’s prohibition on cruel and unusual punishment, the prosecutor (who may or may not have been aware of Roper’s neuobiological status when he gave his closing argument to the jury) made the exact point that Snead relates. In the prosecutor’s opinion, not only was Roper’s age at the time of the offense, 17, \textit{not} a mitigating factor, it was an aggravating factor. Roper, he argued, was an even greater danger to the future peace of the community. The prosecutor noted: “Age, he [defense counsel] says. Think about age. Seventeen years old. Isn’t that scary? Doesn’t that scare you? Mitigating? Quite the contrary I submit. Quite the contrary.”\footnote{\textit{Roper}, 543 U.S. at 558.} Although Missouri apparently does not list “future dangerousness” as a statutorily
prescribed aggravating factor as many states do, it certainly does permit the prosecutor to make the jury aware of the defendant’s violent past.

Still, Snead’s caution seems overstated. On the surface, the long and short term strategies do appear to be in conflict, and the fear of future dangerousness does tend to counteract the defendant’s desire to mitigate culpability. On further review, though, the two goals may reflect, first, different public intuitions about how to deal with criminals, and, second, the goals are, in large part, addressed at different audiences – one judicial, the other legislative. They play different roles in the process. In short, the two goals of neuroscience need not be in battle with each other. In the first instance, Professor Snead has exposed conflicting intuitions, one private, invisible and not-much analyzed – our old retributive brain stems that make themselves heard immediately in response to gruesome facts in primitive ways – and the other, ironically, our public courtroom brains, which are more deliberate and analytical and may be prone, when called upon in jury duty, to doing the right thing in the individual case.

Getting tough on crime has been a shibboleth among the American political class for nearly a generation. Contemporary retributive justice demands payback, and it is commonly delivered in a stern and unforgiving manner. Thus, as individuals sit at home and hope for a safer world, all the while hearing about or reading the news of the most killing or kidnaping or rape, they often lash out, 

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288 See V.A.M.S. 565.032(2.)(1): “The offense was committed by a person with a prior record of conviction for murder in the first degree, or the offense was committed by a person who has one or more serious assaultive criminal convictions.”

289 Damasio, DESCARTES’ ERROR, supra note # –, at 177 (noting the existence of somatic markers that are formed during our process of education and acculturation “by connecting specific classes of stimuli with specific classes of somatic state”).


expressing a desire on behalf of the aggrieved for the most muscular form of retribution – death to the perpetrator. Our amygdalas stand ever ready to let loose a primitive fear response. A majority of Americans seem to concur.

But we occupy very different seats as jurors than we do as armchair commentators because in the former role, our deliberations have real, immediate and often tangible consequences. When jurors are called to mete out the most vicious from of retributive punishment, they are compelled by law, by their oaths as jurors, and by their consciences to determine whether or not the individual is sufficiently blameworthy that the state can bring death upon him. When representatives of the community (except for those who oppose the death penalty) sit in judgment in a death penalty case, platitudes about “getting even” should give way to personal judgment, which brings into view not only the defendant’s crime and circumstances, but one’s own past situation too: oneself, one’s family, friends and acquaintances who have done wrong and for whom we have felt sorry. We know that, as a matter of everyday fact, some individuals lack volitional control. The deliberation process, moreover, can be an emotionally draining experience. But more to the point, the jurors are required by law to consider mitigating circumstances: The Supreme Court has twice struck down death sentencing schemes where jurors could have understood that they must find in favor of death unless

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292 See generally Blumoff, Aesthetics of Retribution, supra note # – .

293 See, e.g., Bloom, supra note # –, at 18-20, 36-7, 65 (noting that the amygdala plays a prominent role in how we respond to fear); Damasio, DESCARTES’ ERROR, supra note # –, at 131-34; Mobbs et al., supra note # –, at 694-95.

294 While there is some data suggesting that the popularity of life without parole has been rising, Capital Punishment in Context, http://www.capitalpunishmentincontext.org/issues/publicopinion; according to statistics provided by Gallup, 69% of Americans sampled in November 2007 still favored the death penalty. http://www.gallup.com/poll/1606/Death-Penalty.aspx. Nearly half of those sampled, 49%, believed that the death penalty was not imposed often enough. Id.


296 Kennedy v. Louisiana, 128 S. Ct. 2641 (2008) (holding that the Eighth Amendment prohibition on excessive punishment precludes the death penalty for the rape of a child where the crime did not result, and was not intended to result, in death of the victim).

297 For a brilliantly made fictional example of this phenomenon, see Nikita Mikhalkov’s 12, a remake of the original Twelve Angry Men. In this iteration, jurors deliberate the fate of a young Chechen man accused of killing his adoptive Russian father. Trailers are available on youtube.com.

they were unanimous on the existence of mitigating factors. The point here is that as long as jurors are required to consider this information, advocates are required by the ethics of the situation to attempt to convince them that neurobiological mitigation is present. It is the only game in town.

In contrast, although rehabilitation is frequently listed as a goal of modern punishment and there are clear questions about what does and does not work, which I take up momentarily, the basic problem is one of political will, not the propriety of rehabilitating those who are susceptible to rehabilitation. For example, California’s 33 prisons now “hold about 159,000 inmates in space designed for fewer than 100,000.” This overcrowding is anathema to rehabilitation; one cannot possibly reduce recidivism in such circumstances. It is thus up to politicians – the legislative and executive branches – to bring about the conditions in which rehabilitation would work where it could work.

V. GETTING SERIOUS ABOUT THE BRAIN

In light of our history of misusing scientific data to move public policy, we have good reason to be cautious. That history contains countless instances of abuse and, too often, or irremediable injury. But the same ability to effect our development in countless unique ways includes within

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304Some of this history is traced by Amanda C. Pustilnik, VIOLENCE ON THE BRAIN: A CRITIQUE OF NEUROSCIENCE IN CRIMINAL LAW, – WAKE FOREST L. REV. – (Forthcoming). An earlier version of the
it the capacity to move us in a generally more compassionate direction than we now move, to move the boundary away from reinforcing a lack of empathy toward one that hopes to redirect and rehabilitate as many injured individuals as we can. In other words, we have within us today the ability to effect long term the daily circumstances of our lives. Then what? We could do nothing, which would effect something; the prevailing ethos always does. If we can move in a more compassionate direction, we will change for the better the location of the midpoint for the least well-off among us. Literally everything depends upon how we adapt to our own unique environments, where the composition of the “environment” includes everything that is not within our inherited genotype. If we fail, it is because we lack the good will to move forward.

A. What can work?

Michael Marcus, a trial court judge in Oregon, notes the basic problem with our approach to sentencing and our deplorable recidivism rates:

Legislation and ballot measures have responded to concerns about crime with draconian sentencing provisions that limit judicial discretion. But our litany elevates punishment well beyond its practical utility, allowing criminal justice to compete unfairly with social expenditures far more productive of crime prevention. We persist in this dysfunction while lamenting, ironically, that repeat offenders do not seem to learn from their experience.305

Put simply, our ties to dualism and the nearly irrebuttable presumption that “they could have chosen otherwise,” combined with the mire of retributivism and the easy political chant of “tough on crime,” continue to undermine our own self-interest. Sherman and others list a number of alternatives with promising results:306

For older male ex-offenders: Vocational training.

For rental housing with drug dealing: Nuisance abatement action on landlords.

For high-crime hot spots: Extra police patrols.

For high-risk repeat offenders: Monitoring by specialized police units.


Incarceration.

For domestic abusers who are employed: On-scene arrests.

For convicted offenders: Rehabilitation programs with risk-focused treatments.

For drug-using offenders in prison: Therapeutic community treatment programs

Sherman and his colleagues are not alone.\textsuperscript{307}

Although there are numerous reasons given for the continuation of the long unsuccessful “get tough” regime, among the “most frightening” conclusions we can reach is that, with respect to rehabilitation, “Nothing works,”\textsuperscript{308} and, more generally, “that we routinely make sentencing choices without information that would help us choose that disposition most likely to avoid future victimizations.”\textsuperscript{309} That nothing works was, when it was made, a vast overstatement.\textsuperscript{310} Some approaches do work, but they require careful attention to and control over a number of details, including careful attention to the risks that conduce to criminal behavior, to the empirical support for those programs that do work, and for whom such programs are most successful.\textsuperscript{311} Then, of course, competency and consistency in delivering the programs have to be assured.\textsuperscript{312}


\textsuperscript{309} Marcus, supra note –, at 676. This point was brought home repeatedly in presentations by and conversations with both federal and state court judges, at the trial and appellate levels, at the Annual Conference of The Gruter Institute for Law and Behavioral Research, Squaw Valley, California, May 18-21, 2009.

\textsuperscript{310} See, e.g., Mark W. Lipsey and Francis T. Cullen, The Effectiveness of Correctional Rehabilitation: A Review of Systematic Reviews, 3 ANN. REV. L. AND SOC. SCIENCE 297 (2007) (undertaking a review of completed meta-analyses of studies of rehabilitation and recidivism, and concluding that some rehabilitative approaches do in fact work, but the issue is complex), \url{http://www.nicic.gov/Library/022757} (page cites unavailable online).

\textsuperscript{311} Id.

\textsuperscript{312} Id.
But beyond all that, nothing will get accomplished in changing the current state of affairs without will. Legislators and penal administrators have it in their means to fund the kind of responses to criminality that could make us all safer as we go to sleep at night. Instead, the emphasis on “get tough” measures has created its own, vicious dynamic.\(^{313}\) Retribution, which is to some extent inescapable in any system of punishment that necessarily begins by looking backwards, is not alone (or perhaps ever) the answer for moving forward. With information arriving from neuroscience and elsewhere, we should begin to bring more thoughtful and successful rehabilitative measures to the forefront of corrections. Bring this information to the front lines of corrections requires substantial rethinking fo our punishment theory and, if we do so, we advance Lincoln’s understanding of the better angels.

Escaping the current retributive regime will not be easy. In his essay *Morality and the Emotions*, J. L. Mackie describes our unwillingness to challenge the established moral arrangements as an instantiation of “the supposed objective prescriptivity of moral features.”\(^{314}\) Mackie would not assert that we can find an objective account of moral qualities or facts; he repudiates this kind of foundationalism. Instead, he observes correctly that our moral intuitions “come[] through a socialization process to objectify moral truths [which] yield[] the misleading appearance of objective reality.”\(^{315}\) In the domain of moral philosophy on which our criminal law rests, one of those truths is that citizens in a liberal democracy begin their journey to a vision of civic virtue from different places. As individuals, we venture into moral philosophy only after we are “already immersed in the assumptions and precedents of a tradition . . . . [They] are not so much arbitrary as inescapable, . . . shaped by the grammar of our native tongue.”\(^{316}\) And one should add, the nature of our beings.

I want to make use of our language and our deeply-held beliefs about human possibility to

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\(^{315}\)Id. Ironically, despite the quote in the text, Mackie is not a radical moral skeptic. In fact, he offers a number of reasons why we must believe in the objective reality of moral obligations, see J. L. Mackie, *Ethics*, supra note # –, at 111-24, where “objective” describes those ontological precepts, like the categorical imperative, by which one ascribes to morality an authority independent of the agent’s wishes and desires. See generally J. D. Goldsworthy, *God or Mackie? The Dilemma of Secular Moral Philosophy*, 30 AM. J. JURIS. 43, 45 (1985). Some empirical support for this proposition comes from the fact that despite a generation or more of criminal code reform in the direction of a subjectivism, see, e.g., Joshua Dressler, *Understanding Criminal Law* 352-4 (2d ed. 1995) (distinguishing between “subjectivist” and “objectivist” approaches to attempts), subjects in experimental settings still insist that actual harm matters in the distribution of punishment. See Christopher Slobogin, (Book review) *Is Justice Just Us? Using Social Science to Inform Substantive Criminal Law*, 87 J. CRIM. L. AND CRIMINOLOGY 315 (1996).

suggest a more compassionate approach to punishment, one that retains responsibility as a core concept but advances the goal without necessarily blaming (or fully blaming) the offender, at least for offenders who substantially lack capacity-in-fact and/or opportunity. The question is not whether those who are adjudicated guilty beyond a reasonable doubt for misconduct we deem criminal and who present a risk of harm to the first or second order interests of others; they should be segregated and constrained for an appropriate amount of time.\footnote{317} The questions are (a) how – given the obvious affects of our neurobiology and, consequently, the vast expanse of our lives over which we have little if any control – are we best served in accounting for the crucial fraction of self over which some citizens lack either capacity-in-fact or the experiences conducive to sufficient control, and (b) whether we can accomplish this objective consistent with our normatively honorable and shared commitment to love and protect our neighbors?\footnote{318}

We should, therefore and in addition to changing our approach to corrections, give serious consideration to some thoughtful suggestions about changing some of our burdens of proof, about adding some robustness to our understanding of rationality and diminished capacity, and bringing the new neuroscientific data to our definition of insanity. The point here is that data from the new brain sciences “can help determine whether individuals possess “particular capacities” that our current jurisprudence requires.\footnote{319} For example, Terry Maroney, with others, has made a strong case for recognizing a the full role emotions play in our understanding or competence, yet that role is routinely marginalized in our law.\footnote{320}

As the Supreme Court recently made clear, most states still use some version of the \textit{M’Naughten} rule for insanity, which emphasizes lack of cognition alone as a condition for establishing insanity.\footnote{321} How can anyone possibly even prioritize his or her cognitions without

\footnote{317} See Michael D. Bayles, \textit{Punishment for Attempts}, 8 SOC. THEORY 19, 23 (1982) (distinguishing between the nature of the interest the putative criminal invades, first- or second-order, where completed crimes violate a first-order interest; that is, the harm violates the interest in life, liberty or property, and attempted crimes, in contrast, violate second order interests–that is, the freedom from fear of loss of a first-order interest, or security).

\footnote{318} I have addressed this issue several times in a narrower context. See, e.g., Theodore Y. Blumoff, \textit{An Essay on Liberalism and Public Theology}, 14 J. LAW & RELIG. 229 (Winter 1999/2000).


\footnote{321} Clark v. Arizona, 548 U.S. 735, 750-51 & nn.12-21 (2006). The lack of cognition in the original \textit{M’Naughton} rule had two dimensions, one addressing knowledge of the nature and quality of
emotional input? It may be true that distinguishing between “can’t” control and “won’t” control presents a particularly difficult distinction to make, but it is not impossible. We ask our mental health professional to make even more difficult decisions daily, such as predicting future dangerousness for purposes of involuntary civil commitment, or post-conviction and sentencing commitment. As Damasio and others point out, individuals who suffer sub-psychopathological deficits to neurological certain areas of the brain may be fully able to tackle problems of logic, and yet “many of their personal and social decisions are irrational, more often disadvantageous to their selves and to others than not.” Some doctrine that gives scope to these obviously important observations is in order.

B. Why finding something that can work matters.

The law moves from day to day by following a fairly strict calendar, which is an absolutely necessary process. That necessity, however, leaves precious little time for practitioners to step back and ask big questions. As a result, basic principles are adhered to and are left mostly unquestioned. From time to time, we should recur to basic principles, to the foundations of our commitment to a shared public theology. We can and must reorient the perspective for judgment by taking seriously our commitment to compassion; it’s fundamental to Judeo-Christian ethics.

“Love your fellow as yourself: I am the LORD.” (Lev. 19:18).

“You shall love your neighbor as yourself.” (Matt. 22:35-40)

one’s act, the other emphasizing knowledge that what the defendant was doing was wrong: One is excused from crime if “the party accused was labouring under such a defect of reason, from 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 he was doing what was wrong.” M’Naughten’s Case, 10 Cl. & F. 200, 8 Eng. Rep. 718,720 (1843). See Peter Westin, The Supreme Court’s Bout with Insanity: Clark V. Arizona, 4 OHIO ST. J. CRIM. L. 143 (2006).

See, e.g., Barefoot v. Estelle, 463 U.S. 880, 896-903 (1983) (holding that psychiatric predictions of future dangerousness are admissible despite protests from the American Psychiatric Association); Kansas v. Hendricks, 521 U.S. 347, 355 n.2 (1997) (holding that state sexual predator statutes that rely on such predictions do not violate due process, notwithstanding the understanding that “it was not possible to predict with any degree of accuracy the future dangerousness of a sex offender”).


We profess to honor compassion. I am suggesting that we actually practice compassion to fill the void left when blame and shame are inappropriate responses to wrongdoing, and they are inappropriate when that which should exist as natural parts of any psychologically healthy person – the capacity for empathy and the ability to control one’s conduct – are absent. The model we ought to subscribe to follows the instructions of Hillel, who proclaims an a posteriori maxim of universal compassion negatively: “What is hateful unto you, do not unto your neighbor. The rest is commentary—now go and study.”

The suggestions put forth in the previous section provide a starting point for a new system to operate. The regime I envision initially suspends blame. It begins at a biographically earlier point in time. It hopes to determine who the person is who deserves our harshest treatment, not merely whether he did it. We should view the propriety of punishment or treatment in a given case as dependent upon scoring on two axes: one axis measures capacity-in-fact, the other axis measures opportunity and its use. On the first axis, the questions address cognition and control: Either the wrongdoer has or does not have sufficient cognitive skills to know right from wrong, and he either can or cannot control his behavior. If he lacks either, he lacks the capacity-in-fact. Although neuropsychological testing and brain imaging may not be perfect, they can provide useful insights into an individual’s brain functioning. The other axis addresses socioeconomic and educational opportunity; one does or does not have such opportunities, and if he has had sufficient opportunity, he either did or did not make appropriate use of them in the past. Under this proposal, meeting the demands of minimum instrumental reasoning – effecting a simple syllogism – simply indicates that the actor should remain in the standard criminal justice system. For those unable even to effectuate a simple practical syllogism, cognitive competency remains an issue; that is to say, blameworthiness is surely compromised and psychiatric treatment and incapacitation may still be required.

Thus those who have ample cognitive capacity, emotional control, and good fortune but fail to make use of it are, prima facie, the most culpable both morally and intuitively for they, when compared to those who are cognitively, emotionally or experientially deprived, more likely could have


done otherwise. (Their crimes may also be the most deterrable.\(^{328}\)) In contrast, those who lack both capacities and suffer bad luck are the least blameworthy for, prima facie, they could not have done otherwise. In the middle are those who possess sufficient cognitive skill and capacity-in-fact but lack the opportunity to adapt appropriately, or lack the capacities but have been blessed with good opportunities; they may well require restraint, but probably not blame, and certainly not vengeful, retributive treatment. For all such groups, education and treatment during their period of incapacity are the only meaningful moral alternatives if protecting future generations is our goal.

C. Moving ahead by taking the brain seriously

This work began with by setting out a view of our criminal jurisprudence that has been substantially unchanged since the Descartes and Kant set on the path to an unforgiving dualist view of humankind. The view, coupled with the rediscovery of Aristotle, led us to the neurobiologically naive Humean view that we are all responsible for our own characters such that when one does an evil deed, one is almost always deemed to have chosen that act. Findings from the brain sciences have put that dictum to the test. Some among us suffer major deficits that do not rise to the law’s test of gross and verifiable psychopathology.

“The contention that an injury can amount to a crime only when inflicted by intention is no provincial or transient notion. It is as universal and persistent in mature systems of law as belief in freedom of the human will and a consequent ability and duty of the normal individual to choose between good and evil.”\(^{329}\) In the same paragraph, Justice Jackson seemed to lament “tardy and unfinished substitution of deterrence and reformation in place of retaliation and vengeance as the motivation for public prosecution.”\(^{330}\) The ability to choose between good and evil provides the moral foundation for our criminal law: “I have put before you life and death, blessing and curse. Choose life.”\(^{331}\) Hebrew Scripture “tells us that even though we have the ability to do evil, we should not do evil. We should do good.”\(^{332}\)

And yet, for nearly two hundred years, we have known that some individuals who are adjudicated competent and sane lack the wherewithal to choose good. Observers have noted the

\(^{328}\) See, e.g., United States v. Bergman, 416 F.Supp. 496, 500 (S.D.N.Y. 1976) (noting that brief period of incarceration for wealthy, well-educated older man who plead guilty to multiple state and federal counts of criminal deliberate non-impulsive fraud “are among the most likely to be generally deterrable”) (citations omitted).


\(^{330}\) Id.

\(^{331}\) Deut. (30:19) TANAKH (Jewish Publication Society 1985).

relationship between injury to the prefrontal lobes, mostly the orbitofrontal cortex and “poor impulse control, explosive aggressive outbursts inappropriate verbal lewdness, jocularity, and lack of interpersonal sensitivity.”

Scientific evidence of dysfunction in the amygdala has been associated with violent aggressive behavior for nearly a generation.334 And we have known that many children who have been subjected to abuse and/or neglect early in their lives bear emotional scars that sometimes do not go away, and suffer brain dysfunction that conduces to a life of violence and criminality.335 The only remaining question is this: When will our criminal justice system take seriously what we have know to be the case almost forever? There are individuals who could not do otherwise, and punishing them – as opposed to incapacitating and treating them – fails our basic standard of morality.


335 Martin H. Teicher, Scars that Won’t Heal: The Neurobiology of Child Abuse, 286 SCI. AMER. 68, *2 (2002), at http://www.theannainstitute.org/stwh.pdf. (page cites unavailable online) (suggesting that abuse disrupts functioning of the limbic system, “a collection of interconnected brain nuclei (neural centers) that play a pivotal role in the regulation of emotion and memory,” and especially the hippocampus, which is important in retrieving memories, and amygdala, which plays a prominent role in creating the emotional subject matter of memory, e.g., fear and aggressive responses thereto); Christopher J. Ferguson, Genetic Contribution to Antisocial Personality and Behavior: A Meta-Analytic Review From an Evolutionary Perspective, 150 J. SOCIAL PSYCHOL. 160 (2010), at http://www.tamiu.edu/~CFERGUSON/evmeta.pdf. (analyzing 38 published articles based on more than 50 observations between 1996 and 2006 in behavioral genetics that genetics contributes substantially to the development of antisocial personality and behavior); Cathy S. Widom and Linda M. Brzustowicz, MAOA and the “Cycle of Violence: Child Abuse and Neglect, MAOA Genotype, and Risk for Violent and Antisocial Behavior, 60 B I OL. PSYCHIATRY 684 (2006).