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The Disruptive Neuroscience of Judicial Choice

Anna Spain Bradley*

Scholars of judicial behavior overwhelmingly substantiate the historical presumption that most judges act impartially and independent most of the time. The reality of human behavior, however, says otherwise. Drawing upon untapped evidence from neuroscience, this Article provides a comprehensive evaluation of how bias, emotion, and empathy—all central to human decision-making—are inevitable in judicial choice. The Article offers three novel neuroscientific insights that explain why this inevitability is so. First, because human cognition associated with decision-making involves multiple, and often intersecting, neural regions and circuits, logic and reason are not separate from bias and emotion in the brain. Second, bias, emotion, empathy and other aspects of our cognition can be implicit, thereby shaping our behavior in ways that we are unaware. This challenges the longstanding assumption that a judge can simply put feelings aside when making judicial decisions. Third, there is no basis in neuroscience to support the idea that judges are exempt from these aspects of human cognition. These findings disrupt widespread faith in the unassailable rationality and impartiality of judges, and demonstrate how such views are increasingly at odds with evidence about how our brains work. By offering an original descriptive account of judicial behavior that is rooted in neuroscience, this Article provides a novel exposition of why bias, emotion and empathy have the capacity to influence the choices judges make. Doing so asks us to view judges as the humans they are.

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INTRODUCTION

Compassion. Anger. Bias. Empathy.¹ These aspects of human cognition are not attributes commonly discussed in the wide body of literature addressing judicial behavior.² Judges (and other adjudicators) are presumed impartial, unbiased, and unemotional in their role as arbiters of law and fact.³ Despite recent examples of judicial bias and other misconduct⁴ and the growth of social movements such as

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¹ This Article employs a neuroscientifically informed definition of bias, emotion, and empathy. For definitions, see infra Sections III.A (bias), III.B (emotion), III.C (empathy).
² RICHARD A. POSNER, HOW JUDGES THINK 5 (“Achieving a sound understanding of judicial behavior is thus of more than merely academic interest; it is a key to legal reform.”); see also infra Part I.
³ This Article uses the term “judges” to indicate a broader group of professional arbiters of law and fact, including judges and arbitrators. See, e.g., 28 U.S.C. § 144 (2012) (providing grounds upon which parties may file an affidavit alleging judicial bias and stating the available remedies); MODEL CODE OF JUD. CONDUCT r. 2.2 (AM. BAR ASS’N 2010) (“A judge shall uphold and apply the law, and shall perform all duties of judicial office fairly and impartially.”).
#metoo, #timesup, and #blacklivesmatter that recognize the prevalence of bias and inequality in society, the legal profession remains committed to a longstanding view that judges are largely exempt from such faults. Judges are viewed as exemplary citizens capable of answering Aristotle’s call that the law is reason free from passion.

Before accepting this axiom as truth, we must investigate how judges make decisions about law and consider what roles bias, emotion, and other factors play in those decisions. In the extensive literature on judicial behavior from an array of legal subfields and across disciplinary methodologies, the foundational assumption that judges are capable of choosing to be rational and unbiased prevails. In addition, legal scholarship on the role of emotion in judicial decision-making is...
scant. Even when scholars recognize the existence, and perhaps even the value of emotionally-aware judges, they often evince defensiveness, as if the very discussion of such matters demands justification. These views manifest a central presumption rarely questioned by the prevailing literature on judicial behavior—that logical reasoning can occur absent bias, emotion, and empathy.

Judges, too, often adopt this presumption when they assert views about how they judge or how they think they ought to. U.S. Supreme Court Justice Sonia Sotomayor acknowledges that judges have emotions, but cautions that “[i]t’s not the heart that compels conclusions in cases, it’s the law. [. . .] Recognize those feelings and put them aside.” Chief Justice John Roberts, expressing his preference for judicial restraint, has stated that “[j]udges and justices are servants of the law, not the other way around. Judges are like umpires. Umpires don’t make the rules; they apply them.” The late Justice Antonin Scalia advised that “good judges pride themselves on the rationality of their rulings and the suppression of their personal proclivities, including most especially their emotions.”

11. See, e.g., Jamal Greene, Pathetic Argument in Constitutional Law, 113 COLUM. L. REV. 1389, 1391 (2013) (discussing emotional argument by judges and parties in constitutional law); id. (“And yet one detects an unexamined ambivalence toward the appropriate role of emotion in constitutional discourse. Taxonomists of constitutional argument, even those whose project is descriptive, typically ignore or dismiss emotional appeal as a standard mode of persuasion in constitutional law.”); id. at 1393 (“Still less has been written of the distinct role of a judge as a producer rather than a recipient of emotional appeals.”).


13. In neuroscience, the unit of analysis is the individual person and her brain. For purposes of this Article, I apply neuroscientific insights about individual decision-making behavior to judges and arbitrators in domestic, foreign and international courts and tribunals. Key differences related to judicial authority, function, and institutions become relevant in normative applications and are discussed in Part IV of this Article.


Many other judges around the world share similar views. At the International Court of Justice, where judges are called upon to decide some of the most significant legal questions in the world, such as the legality of the use of nuclear weapons or genocide, there is a commonly-held belief that legal analysis can remain unaffected by bias and emotion. Former International Court of Justice Judge Thomas Buergenthal, in deciding the allegations of genocide in the Democratic of the Congo brought against Rwanda said, “I always felt that I would only write a separate opinion if there was a principle, a view I thought I had better put down. I didn’t feel so in this case. The human element challenged my extraneous notions, not my juridical ones.” Taking a similar view, former International Court of Justice judge ad hoc Georges Abi-Saab amplifies that no matter one’s emotions or beliefs in a case, in determining judicial opinions, “one ought to do no violence to the law.”

There are notable exceptions, of course, particularly in divisive cases involving core values such as the legality of abortion. In *Webster v. Reproductive Health Services*, Justice Blackmun expressed his emotion in his defense of his opinion in *Roe v. Wade* writing “I fear for the future. I fear for the liberty and equality of the millions of women who have lived and come of age in the 16 years since *Roe* was decided. I fear for the integrity of, and public esteem for, this Court.” In *PA v. Casey*, Justice Scalia passionately disagreed with other members of the Court saying, “I must, however, respond to a few of the more outrageous arguments in today’s opinion, which it is beyond human nature to leave unanswered.”

U.S. Court of Appeals Judge and scholar, Richard Posner, believes that “an American judge, especially at the appellate level, is an occasional legislator, yet with no constituency to answer to, his judging is likely to be influenced by temperament, emotion, experience, personal background and ideology . . . .” Beyond such occasional statements by judges themselves, we know little about how judges, as human beings prone to emotion and bias, actually make the legally complex and often morally challenging choices
they make. But we do know that the presumption that judges are to be impartial and dispassionate in exercising their judicial duties is nearly ubiquitous.

This cardinal premise—that judges are impartial because they can choose to be so—is wrong. This Article invokes insights from neuroscience in three fundamental ways to reveal the limitations in this legal understanding of judicial choice. First, the neural activity in our brains associated with decision-making can be integrally interconnected with brain activity engaged in bias, emotion, and empathy. The rich complexity of neural connections means that multiple regions of the brain and neural circuits can participate sequentially or concurrently when producing thought that we understand to be a decision. These same regions and networks may also activate if a person is experiencing emotion or bias or empathy. Studies employing functional Magnetic Resonance Imaging (“fMRI”) evidence why this is so by showing how emotion intersects with areas in our brain that process judgment. Second, when making a choice, people are subject to implicit, or hidden, cognition. Although we know what our outcome or decision is, we can remain largely unaware of the complex process involved in accessing a distant memory or in determining a future risk that our brains employed to get there. This is why our choices can be influenced by implicit bias or other forms of implicit cognition.

23. Id. at 2 (“The difficulty outsiders have in understanding judicial behavior is due partly to the fact that judges deliberate in secret, though it would be more accurate to say that they do not deliberate (by which I mean deliberate collectively) very much is the real secret.”). See generally LAWRENCE BAUM, THE PUZZLE OF JUDICIAL BEHAVIOR (2004) (exploring judicial goals and their impact on judicial decisions); DANIEL TERRIS, CESARE P.R. ROMANO & LEIGH SWIGART, THE INTERNATIONAL JUDGE: AN INTRODUCTION TO THE MEN AND WOMEN WHO DECIDE THE WORLD’S CASES (2007).

24. BENJAMIN N. CARDOZO, THE NATURE OF THE JUDICIAL PROCESS 168 (1921) (recognizing that this “ideal . . . is beyond the reach of human faculties to attain); ROBERT E. KEETON, KEETON ON JUDGING IN THE AMERICAN LEGAL SYSTEM 15 (1999) (acknowledging that judges make “value-laden” rulings); William J. Brennon, Reason, Passion and “The Progress of the Law,” 10 CARDOZO L. REV. 3, 9 (1988) (describing passion as “the range of emotional and intuitive responses to a given set of facts or arguments, responses which often speed into our consciousness far ahead of the lumbering syllogisms of reason” and arguing that “passion” in judicial judgment is essential to “anchor judicial ruling to human realities, preventing the law from becoming sterile and bureaucratic”).

25. Neuroscientists ask, what is the task that the brain is engaging in and how can we best deconstruct that task into components that can be studied? See Antoine Bechara, Human Emotions in Decision Making: Are They Useful or Disruptive?, in NEUROSCIENCE OF DECISION MAKING 73, 74–76 (Oshin Vartanian & David R. Mandel eds., 2011).

26. See PATRICIA CHURCHLAND, TOUCHING A NERVE: THE SELF AS BRAIN 197–98, 201 (2013) (describing the concept of “hidden cognition” from a psychological perspective and discussing the distinctions between conscious, subconscious, subunconscious, and nonconscious); RIAN E. MCMULLIN, THE NEW HANDBOOK OF COGNITIVE THERAPY TECHNIQUES 68 (2000) (“The third cognition between emotion and behavior is a belief I call the hidden cognition. It is hidden because most clients are not aware of its existence. The [hidden belief] occurs after clients feel an emotion, but immediately before they engage in a behavior. Most clients don’t notice this cognition because it is so rapid they experience it as a vague impression, an undigested conception often occurring before they can put it into words.”).

Third, these neuroscientifically informed understandings of human thought are generally applicable to most people. Although potential exceptions are known to occur in the brains of young people, people with addiction to drugs and those suffering from brain injury or mental disorders, no known exceptions exist for people on the basis of their work as judges. Judges are subject to the same cognitive realities of human thought that sustain and plague all of us.

This Article’s findings disrupt the widely held view that judges are rational actors capable of putting bias and emotion aside in order to form decisions on the basis of law and fact. Here, I examine three aspects of implicit cognition relevant to judicial behavior and commonly studied in neuroscience research: bias, emotion, and empathy. Of course, any attempt to apply neuroscientific studies to legal scholarship is subject to important limitations and risks, which I discuss at length in Part II. However, the general inference that bias, emotion, and empathy have the capacity to influence the choices we make at the neural level is well evidenced. In applying that inference, this Article makes a novel contribution to the extensive literature on judicial behavior. It also calls for renewing the discourse in our field about both the desirable and the dangerous impacts associated with recognizing the reality of bias in the law as we aim to affirm the value of judges in society today.

The Article demonstrates its claim in four parts. Part I identifies and describes the existing approaches in legal scholarship to understanding judicial decision-making, covering theoretical, empirical, and behavioral approaches. It shows how thought about judicial behavior in general, and judicial decision-making in particular, is rooted in the foundational presumption that law is not the product of bias or emotion. Part II counters the conventional scholarship by introducing a neuroscientifically driven framework for understanding and studying individual choice and the brain. In doing so, it describes what neuroscience is, how studies in this field are conducted, and why outcomes are subject to limitations that legal scholars need to understand. Part III deepens the neuroscientific analysis in order to describe how three aspects of our implicit cognition—bias, emotion, and empathy—affect our decision-making in ways in which we are not aware. I use this evidence to challenge the prevailing view that judges are capable of putting their emotions aside, even when they explicitly aim to do so, given modern understandings of our brains. Part IV emphasizes the Article’s central claim—that bias, emotion, and empathy are inevitable in judicial decision-making—and advances a discourse about the contributions and controversies that follow. By providing a neuroscientifically driven account of judicial behavior, the Article aims to humanize our understanding of law. It offers a new foundational truth: that

whatever else we believe law to be, it is also the product of human thought and feeling.

I. DECODING JUDICIAL BEHAVIOR

How do judges decide? Why do we care? Let’s consider the second question first. Judges hold great power in our society. They can sentence people to life in prison. They can choose which parent will have custody of a child. At the highest levels, they have the power to shape fundamental social battles over segregation, abortion, privacy, gay marriage, and more. Because of their power, judges remain a central pillar of our legal system in America and in other courts around the world. As such, judges symbolize the promise embodied in the pursuit of the rule of law, namely order, justice, and a world governed by rules, not by despotic rulers.

Since we care about the power judges have, we care about how they exercise that power. This is where the professional judicial duties of independence and impartiality show up most vividly. But they alone fail to describe and help us understand judicial behavior. For that, there is a vast arena of legal scholarship where ideas on the subject abound. Here, theoretical and methodological frames of reference matter because deep inquiries into understanding the phenomenon of how judges decide cases are also rooted in the perspective one takes. Analyzing judicial behavior in the American legal tradition is quite a different endeavor than doing so in international law (not to mention views in other countries and legal systems).28 One could explore this subject through legal positivism or realism.29 The answer might be found by applying a policy-oriented perspective following Hart and Sacks or invoking the New Haven Approach.30 We might consider critical race theorists alongside Third World Approaches that rightly reveal theories others avoid about how law has contributed to racial injustice in many societies.31 Or we can

28. See generally THE ROUTLEDGE HANDBOOK OF JUDICIAL BEHAVIOR (Robert Howard & Kirk Randazzo eds., 2018) (providing American and comparative perspectives and covering the attitudinal model, ideology, strategic behavior, political influences, and more).
29. For a comprehensive take on the history, meaning and application of various international legal theories of law, see ANDREA BIANCHI, INTERNATIONAL LAW THEORIES (2016).
learn from feminist critiques of male-dominated judging methodologies. McCandless, Enright, and O'Donoghue, for example, write in the context of Northern Ireland about adopting a “feminist judging methodology” that makes use of judges’ common knowledge of gender bias, exposes narratives that work against women in the courtroom setting, and identifies the need for increased feminism awareness in judicial decision-making.

Part I organizes the literature on judicial behavior into three methodological areas—theoretical approaches, empirical approaches and behavioral approaches—while acknowledging that there is also overlap among these categories. This overview, while not comprehensive, illustrates the prevalence and persistence of the basic presumption that judges do and should decide impartially and on the basis of logical reasoning.

A. Theoretical Approaches

The study of judicial behavior has a long history in legal thought, guided by ideas about legal formalism and other theories. But whether you believe judges make law or merely interpret it, all judges, as scholar Karen Alter has said, have the “power to speak the law.” Consequently, the study of judicial behavior is of interest to a variety of fields including law, economics, psychology, and sociology, each with their own methodologies. Scholarship is sometimes categorized by the type of decision maker, for example, the study of judges from that of arbitrators, noting their different legal mandates and judicial functions. An added level of complexity is that judicial behavior can be explored specifically within the judicial system of a certain geographic context distinguishing, for example, between courts in the United States, regional courts, international courts, and courts in different countries. This raises important questions about how a study of judges in one country should inform understandings about judges in another.

Much of the literature focusing on judges in the United States takes a positivist approach—seeking to describe and define the behavior of judges, arbitrators, and

33. NORTHERN/IRISH FEMINIST JUDGEMENTS 8 (Mairead Enright, Julie McCandless & Aoife O'Donoghue eds., 2017).
34. Brian Leiter, Positivism, Formalism, Realism, 99 COLUM. L. REV. 1138, 1145–46 (1999) (book review) (“[W]e may characterize formalism as the descriptive theory of adjudication according to which (1) the law is rationally determinate, and (2) judging is mechanical. It follows, moreover, from (1), that (3) legal reasoning is autonomous, since the class of legal reasons suffices to justify a unique outcome; no recourse to non-legal reasons is demanded or required.”).
other adjudicators. Are judges biased? Do apologies influence judges? What role does reputation play? How do arbitrators approach legal decision-making?

Those following this theoretical view intend to describe judicial behavior as it is, not as it should be. Among the many important scholarly voices in this area, former judge and legal scholar Richard Posner’s recent book aims to provide a comprehensive positivist framework of nine approaches to judicial choice. Attitudinal theory, for example, claims that judicial decisions are influenced by the judge’s own political views. Pragmatism is based on assumptions that judicial opinions are determined by a judge’s own sense of the outcomes as compared to legalism, in which a judge’s decisions are believed to be determined by the law. Sociological theory draws upon social psychology and rational choice theory. Strategic theory draws upon positive political theory.

Scholars also advance normative views that impact the analysis of judicial decision-making. For example, Martha Nussbaum’s work has advanced the view that emotion is an internally embedded influence in law, and Susan Bandes has written about why emotion should matter in law. The normative concern extends

39. See generally GAROUPA & GINSBURG, supra note 9.
41. See generally POSNER, supra note 2.
43. POSNER, supra note 2, at 40.
44. Id.
46. See, e.g., Martha Nussbaum, HIDING FROM HUMANITY: DISGUST, SHAME, AND THE LAW (2004) (analyzing the role of emotion in criminal law, political liberalism and more); Martha Nussbaum, POLITICAL EMOTIONS: WHY LOVE MATTERS FOR JUSTICE 6 (2013) (describing “the ways in which emotions can support the basic principles of an aspiring yet imperfect society”); MARTHA NUSSBAUM, UPEHAVALS OF THOUGHT: THE INTELLIGENCE OF EMOTIONS (2001); THE PASSIONS OF LAW (Susan Bandes ed., 2000) (describing itself as the “first anthology to treat the role that emotions play,
beyond the positivist project of proving or documenting whether or not emotion influences judges. Instead, normative views seek to say something more; namely, that emotion should be a vital area of study in law.

Another vital area of normative discourse (which is, at times, also empirical) concerns racial bias. In America, concerns about racial bias by judges and juries have a long history and a continuing impact that prompts scholarship that seeks to eradicate judicial behavior rooted in racism. In the global context, Won Kidane’s work has illuminated how certain identities have more influence in international arbitration due to the deeply held hierarchical beliefs about which cultural practices and values matter. This inequity and the damage it causes are behind his call for diversification of judicial and arbitral institutions.

Normative concerns about gender bias have become more common in recent years. Nienke Grossman’s work on sex representativeness on international courts, for example, is rooted in normative beliefs about the value of diversity and the legitimacy of these institutions. Harlan Cohen adds a normative perspective,

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49. See generally WON KIDANE, THE CULTURE OF INTERNATIONAL ARBITRATION (2016); see also Alter, supra note 35 (observing domestic adjudicators may have different approaches than international courts and tribunals).

informed by sociology, that law is ultimately best understood as relational and rooted in the community in which it operates.51 The prevailing solutions advanced by many of these perspectives focus on reforming courts as institutions but say less about the need for individual reform of judges.

B. Empirical Approaches

Empirical scholarship on judicial behavior aims to reveal new methodologies for understanding judicial behavior. Scholars are interested in what judges say about how they decide and about what influence their values or ideologies have in their decision-making practices.52 Using empirical analysis, scholars survey judges and arbitrators and conduct interviews, which may reveal quantitative and qualitative data, often self-reported, about judicial behavior.53

Scholarly interest in empirical methodological approaches stems from the view that quantitative and qualitative data offer an evidence-based approach to understanding phenomena that theory does not.54 Here, methodological design matters. Since empirical work is still sparse, scholars apply different models and assumptions to test general concepts about judicial behavior.55 The value of any inferences a study may show are subject to factors such as an insufficient sample size or selection effects, since the subjects studied—judges and arbitrators—are not always available or willing participants.56 Even where a study enjoys strong

51. Telephone Interview with Harlan Cohen, Author (July 17, 2017).
54. See, e.g., Rose McDermott, New Directions for Experimental Work in International Relations, 55 INT. STUD. Q. 503 (2011); Alex Mintz et al., Experimental Approaches to International Relations, 55 INT. STUD. Q. 493 (2011); Greg Shaffer & Tom Ginsburg, The Empirical Turn in International Legal Scholarship, 106 AM. J. INT’L L. 1, 1 (2012).
participation, analysis must be careful to distinguish between what judges say about their own behaviors from what third-parties observe. These limitations aside, empirical work on judicial behavior has advanced the awareness of the need for evidence-based approaches to describing judicial behavior.

C. Behavioral Approaches

A third approach to understanding judicial behavior is to apply insights about human behavior. Enter behavioral sciences. This term is often used as a succinct descriptor for multiple approaches advancing the so-called “behavioral revolution” in the social sciences. The assumption underlying behavioral approaches is, very generally speaking, to draw inferences about human behavior by observing said behavior, largely in laboratory settings. Social sciences such as psychology, economics, and sociology employ methodologies aimed at observing human behavior under controlled conditions.

Behavioral research, particularly in psychology and economics, has been at the forefront of investigating rationality in decision-making. Scholars have problematized existing notions that rational choice theory provides an accurate descriptive model of human behavior, as new research observes that people make choices that are not rational, often in predictable ways. One area of intense focus concerns cognitive biases such as positive illusions, where studies observe that people are primed to be systematically biased in positive ways. Another well-

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57. See generally Emilie M. Hafner-Burton et al., The Behavioral Revolution and International Relations, 71 INT’L ORG. S1 (2017).


60. Gregory M. Herek et al., Decision Making During International Crises, 31 J. CONFLICT RESOL. 203, 204 (1987) (explaining why rational choice theory is descriptively and normatively inadequate for improving the quality of decisions); see Amos Tversky & Daniel Kahneman, Judgment Under Uncertainty: Heuristics and Biases, in JUDGMENT UNDER UNCERTAINTY: HEURISTICS AND BIAS 3 (Daniel Kahneman, Paul Slovic & Amos Tversky eds., 1982) (explaining that the processes that individuals use to make decisions can sometimes lead to “severe and systematic errors”).


63. DOMINIC JOHNSON, OVERCONFIDENCE AND WAR: THE HAVOC AND GLORY OF POSITIVE ILLUSIONS 6 (2004) (describing adaptive overconfidence as a widespread human trait; for examples, studies suggest that people who use more positive words than negative in their daily
established bias occurs as overconfidence, or overestimating one’s knowledge. If you see a relationship between two things that does not really exist, this is an illusory correlation. Status quo bias shows that we tend to prefer an option framed as the status quo. Many biases relate to how people interact with information. Anchoring, for example, shows up as the tendency to rely too heavily on the first information presented when making a decision.

Another set of deviations from rationality are conceptualized as heuristics, which are cognitive strategies or mental shortcuts we use in the face of complex or incomplete information to make decision-making easier. Stereotyping, for example, is an adaptive trait we evolved to process information quickly even though our determinations based on stereotypes are often inaccurate and deeply flawed. Herbert Simon introduced the term “satisficing” to describe the ways our minds process judgments that are “good enough.” His insight was that although rational people intend to be rational, we often lack the information necessary to make a rationally optimal choice. Both cognitive biases and heuristics can contribute to judgment errors and other decision-making pathologies. People may also choose to avoid making any decision in uncertain circumstances.

Within this already complex web of scholarship are those scholars who blend behavioral approaches in their study of legal topics. For some legal scholars, these
insights lead to prescriptions about how to improve individual decision-making and normative arguments about whether law ought to do so. Cass Sunstein and Richard Thaler’s work, rooted in behavioral law and economics, on choice architecture, aimed at altering one’s external decision environment to encourage or “nudge” a person toward better choices, is a well-known example of this.73

Behavioral psychology has also been employed by scholars to advance theories about judicial behavior at the individual level.74 For example, Chris Guthrie, a legal scholar specializing in behavioral law and economics, has been studying judicial decision-making for a long time.75 His work, often co-authored with other experts, has addressed anchoring effects in criminal sentencing and civil trial damages awards.76 More recently, he has proposed the “intuitive-override” model of judging based on psychological research, arguing that “intuition is more likely than deliberation to lead judges astray.”77 Linda Berger raises this in the context of behavioral psychology to the legal debate on presidential war powers. For international legal scholarship in this area, see Ryan Goodman et al., Introduction: Social Science and Human Rights, in UNDERSTANDING SOCIAL ACTION, PROMOTING HUMAN RIGHTS 6–8, 16 (Ryan Goodman et al. eds., 2012) (describing the new research in empirical economics and social psychology); Tomer Broude, Behavioral International Law, 163 PENN. L. REV. 1099 (2015); Jean Galbraith, Treaty Options: Towards a Behavioral Understanding of Treaty Design, 53 VA. J. INT’L L. 309 (2013) (discussing the link between individual cognitive errors and state-decision errors in consenting to treaties and arguing that international legal actors should incorporate insights from choice architecture into their decision-making); von Aaken, supra note 59, at 47 (describing the influence of the Law and Economics movements on international law); Andrew K. Woods, A Behavioral Approach to Human Rights, 51 HARV. INT’L L.J. 51, 52–56 (2010) (investigating the implications of recent insights from behavioral economics for international human rights).

73. SUNSTEIN & THALER, supra note 72, at 8.

74. See generally sources by Chris Guthrie cited supra note 53.

75. Micheline Favreau & Norman S. Segalowitz, Automatic and Controlled Processes in the First- and Second-Language Reading of Fluent Bilinguals, 22 MEMORY & COGNITION 565 (1983) ( theorizing foreign language evaluations require more deliberate processing and fewer intuitive assessments); Boaz Keysar, Sayuri L. Hayakawa & Sun Guay An, The Foreign-Language Effect: Thinking in a Foreign Tongue Reduces Decision Biases, 23 PSYCH. SCI. 551 (2012); Rachlinski, Wistrich & Guthrie, supra note 53, at 696–97 (“Our results suggest that anchoring is so persistent, unexpected, and widespread that the process of assigning awards and sentences might be pervasively unreliable, absent some remedial intervention.”).

76. Guthrie et al., Blinking on the Bench, supra note 53, at 105 (“As we demonstrate below, judges are predominantly intuitive decision makers, and intuitive judgments are often flawed.”). But see Braman, supra note 47, at 491 (“Guthrie et al. treat the propensity to engage in deeper reasoning as an individual characteristic by categorizing participants according to their scores on a Cognitive Reflection Task.

77. Guthrie et al., supra note 53, at 105. "As we demonstrate below, judges are predominantly intuitive decision makers, and intuitive judgments are often flawed." But see Braman, supra note 47, at 491. ("Guthrie et al. treat the propensity to engage in deeper reasoning as an individual characteristic by categorizing participants according to their scores on a Cognitive Reflection Task.)
judicial decision-making and argues that intuition’s helpfulness or harmfulness changes depending on whether judges are making judgments about people as compared to engaging in problem solving.78

Dan Kahan’s work applies psychology to the study of cognition in legal decision-making. He has argued that understanding cognitive models such as coherence-based reasoning or motivated reasoning can be useful for legal scholars, but cautions against applying them to the decision-making behavior of judges because, in his view, “[t]he study of cognition establishes that professional judgment is special.”79 This significant caveat aside, Kahan’s approach aims to understand how decisions are made in the brain and his findings, such as “‘[c]ultural cognition’ is a species of motivated reasoning that promotes congruence between a person’s defining commitments . . . and his or her perceptions of risks and related facts,” are illuminating.80 This work provides important complexity to understanding the merits and the limitations of behavioral work.

Together, these studies have been incredibly important in launching a “behavioral” turn in a variety of areas of law.81 At their core, they offer new grounds for understanding human behavior in the law and challenge longstanding assumptions in the legal profession, including rational choice theory.82 Broadly speaking, research at the intersection of law and behavioral psychology is helpful because it explains what is going on and allows for new ways of observing legal behavior and new observations of legal behavior. But most behavioral approaches are not designed to explain how or what neuroscientists call the neural mechanism responsible for the observed behavior.83
II. THE NEUROLOGICAL BASIS OF INDIVIDUAL CHOICE

What does neuroscience bring to the study of judicial behavior? As many scholars have argued, there are certainly institutional and structural problems associated with judicial behavior where reform at those levels is advisable. This might include adopting quotas or aspirational targets for diversifying courts and tribunals, making selection processes of judges more transparent, or adopting procedural reforms. But judicial reform in these areas is not a substitute for reform at the individual level. As I’ve argued before, sometimes the problem is structural or institutional, but sometimes a person is the problem. In discussing the International Court of Justice, Andrea Bianchi explains that the point is that the judges, not the Court—as the latter does not exist independently of human beings, regardless of our desire to attribute to it anthropomorphic features—made a deliberate choice not to entertain the case and to dismiss it right away, upholding the very first objection on jurisdiction.

I strongly agree with his view. Judges shape the law, and judges are human beings. This is why a comprehensive and accurate understanding of judicial behavior must also account for the scientific realities of human behavior.

To do this, we must narrow the focus from the concept of judicial behavior to judicial choice. It is important to frame what I mean by this idea. Studying judicial choice through the lens of neuroscience involves studying the cognitive processes that people use when they make decisions. “Choice” here refers to the set of internal processes by which a person reaches an outcome. The cognitive activity inside a person’s brain may be framed externally in different ways such as decision, an act of judging, problem solving, making inferences, etc. The focus here is on what is happening inside of the mind of the judge. To investigate this central question, I analyze three subsidiary questions: (1) How do brains decide?; (2) What is the effect of certain cognitive aspects, such as emotion and empathy, on decision-making?; and (3) Are there cognitive processes that are implicit or hidden because we are unaware of them?

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84. See supra Section I.
85. See Franck et al., supra note 53, at 1171–72 (suggesting structural and procedural mitigation, such as group deliberation); Grossman, Shattering the Glass Ceiling, supra note 50, at 396–404 (calling for the adoption of aspirational targets or quotas).
88. Bianchi, supra note 37.
89. Tom Ginsburg & Nicholas Stephanoupolous, The Concepts of Law, 84 CHI. L. REV. (UNBOUND) 147 n.10 (2017) (“Concepts provide the mental architecture by which we understand the world and are ubiquitous in social science as well as law.”).
90. See generally PAUL BREST & LINDA HAMILTON KRIEGER, PROBLEM SOLVING, DECISION MAKING AND PROFESSIONAL JUDGEMENT (2010).
Neuroscience—a broad term covering different sub-approaches—explores what is happening in the brain. Studies can show mechanisms in the brain that help explain a behavior observed through a psychological study or reported through empirical research. These studies have been adopted and applied to legal scholarship spawning the new area of neurolaw, which emerged as a field of study about a decade ago. Scholars have applied neuroscience to questions regarding tort, dispute resolution, and philosophy. The majority of neurolaw scholarship is in the area of criminal law. Neuroscience informs legal questions about criminal


culpability and intentionality, for example, by revealing the degree of choice or free will a person executes over her or his intentional acts. For instance, Gert-Jan Lokhorst has explored how neuroscience implicates what we know about logical reasoning and the implications of such for understanding legal concepts such as mens rea. Information from neuroscience about adolescent brain development, for example, can be useful for legal scholars investigating criminal responsibility and punishment for juveniles.

Despite the many advancements some criminal law scholars claim that neuroscience will provide, others remain cautious or skeptical. Michael Pardo and Dennis Patterson, who have advanced the field of neurolaw with their research, also find fault with the way others apply inferences derived from neuroscientific studies to criminal law. Walter Glannon identifies important limitations in applying neuroscience to matters of criminal intent arguing that

> even in cases where imaging displaying brain dysfunction might be used to support the claim that an individual lacked the capacity to intend to kill and thereby change a conviction from first degree murder to second degree murder or manslaughter, behavioural evidence would be needed to confirm the neuroscientific findings.

He finds that neuroscience may play a stronger role for criminal matters involving questions of impulse control as “the correlations between images of brain dysfunction and behavior are stronger.” As this field advances its application of neuroscience to law, we can learn from the insights and limitations such studies have revealed.

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97. Stephen J. Morse, Lost in Translation? An Essay on Law and Neuroscience, in LAW AND NEUROSCIENCE: CURRENT LEGAL ISSUES, supra note 92, at 529, 541–43 (offering several ways neuroscience contributes to criminal law scholarship, including (a) confirming or challenging a central view that doctrine or practices rely upon, (b) indicating the need for new doctrine or practices, (c) using neural data as evidence in a trial or proceeding, and (d) enhancing accuracy of predictions that inform policy).

98. P ARDO & PATTERSON, supra note 91, at 52–63 (discussing limitations of using neuroscience to make arguments about moral decision-making); Michael S. Pardo & Dennis Patterson, The Promise of Neuroscience for Law: Overclaiming in Jurisprudence, Morality, and Economics, in PHILOSOPHICAL FOUNDATIONS OF LAW AND NEUROSCIENCE 231 (2016). See generally Michael S. Pardo & Dennis Patterson, Minds, Brains, and Norms, 4 NEUROETHICS 179 (2011) (critiquing neurolaw approaches by distinguishing between behavior and brain activity associated with rule-following, interpretation, knowledge and criminal responsibility); Michael S. Pardo & Dennis Patterson, Neuroscience, Normativity, and Retributivism, in THE FUTURE OF PUNISHMENT 133 (Thomas A. Nadelhoffer ed., 2013) (taking a cautious view of the influence of neurolaw in undermining criminal law).


100. Id. at 21 (“A functional brain scan showing an underactive prefrontal cortex or overactive amygdala by itself will not be diagnostic of a loss of impulse control or cognitive control of one’s behaviour.”).
Part II introduces evidence and insights from neuroscience to the discourse on judicial behavior and decision-making. Herein, I recognize that my novel use of this approach to study judicial choice is subject to further refinement as the work integrating law, neuroscience and judicial decision-making is emergent.

A. On Neuroscience and How to Use It

Neuroscience is the study of the brain, its organization, and its functions. Our brains are composed of neurons, which are nerve cells that form the basic unit of the brain and promote activity or inhibit activity. Glial cells, or “glia,” support neurons structurally and assist in forming the fatty myelin that further support neurons. The basic function of our neurons is to transmit information in our brains allowing for a wide array of cognitive functions that shape behavior. They do so through molecules called neurotransmitters, which are diverse and varied in their form and function. Serotonin, the neurotransmitter known for aiding in sleep and histamines, the neurotransmitter known for its role in producing seasonal allergies, are two common examples.

In terms of mapping regions within the brain, neuroanatomy has revealed that the frontal lobe is located behind our foreheads, the occipital lobe is behind the nape of our necks, and that there are regions of the brain that remain undiscovered. The field of neuroscience employs various tools to study brain activity and function, from the older Electroencephalography (EEG), which measures electrical activity, to newer methods such as Transcranial Magnetic stimulation (TMS) for testing changes in brain activity. Advances in neuroimaging

101. For emergent scholarship taking such an approach, see Bradley, supra note 87; Paul S. Davies & Peter A. Alces, Neuroscience Changes More than You Can Think, 1 J.L. TECH. & POL’Y 141 (2017). For work in law and neuroscience on decision-making, see, e.g., LAW AND NEUROSCIENCE: CURRENT LEGAL ISSUES, supra note 92; Oliver R. Goodenough, Mapping Cortical Areas Associated with Legal Reasoning and Moral Intuition, 41 J U R IMETRICS 429, 431 (2001) (arguing for re-conceptualizing law in response to neuroscience).

102. Hafner-Burton et al., supra note 57, at S3 (“Also new are the efforts to anchor behavioral observations in a stronger neurological foundation through advances in brain science.”).


104. For an overview of the fundamentals of neurons, see Annabelle M. Belcher & Adina Roskies, Neuroscience Basics, in A PRIMER ON CRIMINAL LAW AND NEUROSCIENCE 4 (Stephen J. Morse & Adina L. Roskies eds., 2013); see generally GAZZANIGA ET AL., supra note 103; ERIC R. KANDEL, JAMES H. SCHWARTZ & THOMAS M. JESSELL, PRINCIPLES OF NEURAL SCIENCE (4th ed. 2000); LARRY SQUIRE, FUNDAMENTAL NEUROSCIENCE (3d ed. 2008).


106. Id.

107. Id. at 10.


109. See Maria de la Iglesia-Vaya et al., Brain Connections – Resting State fMRI Functional Connectivity, in NOVEL FRONTIERS OF ADVANCED NEUROIMAGING 51, 52–54 (Kostas N. Fountas ed., 2013) (describing the ways in which “exploring the neuroanatomy of the brain and the underlying connectivity of different functional areas [allow us to attain] new insights on the organization of the human brain.”).
allow us to observe anatomical connectivity (e.g., how different regions of the brain connect) and functional connectivity (e.g., how different cognitive processes interact), which permits the study of how structure and function are connected.  

Neuroscience research today relies heavily on fMRI brain scans to test and to study cognitive processes and behavior, such as how moving your finger to scroll through an app on your iPhone activates certain parts of your brain. Studies utilizing fMRI provide evidence showing that anatomically distinct regions of the brain do more work during different types of reasoning. For example, neural components accompany common decision-making biases such as framing effects. This research highlights the complexity of our brains while also discrediting commonly held but erroneous ideas, such as the “left brain” or “right brain.”

This study provides an example of fMRI research on “[brain activation (event-related fMRI) elicited by abstract emotion words (in red), which is compared with that to face-related (in green) and arm-related action words (in blue). Note that the inferior motor and premotor cortex also sparked by face and arm words is also activated by abstract emotion words.”

110. Id.

111. See GAZZANIGA ET AL., supra note 103 (discussing how fMRI works, comparing it to PET scans, and discussing the reasons behind its popularity as a mechanism for scientists).

112. See Vinod Goel et al., Disassociation of Mechanisms Underlying Syllogistic Reasoning, 12 NEUROIMAGE 504, 512–13 (2000) (using an event-related fMRI study of syllogistic reasoning using sentences with and without semantic content and finding that the left-temporal system was recruited during content-based reasoning, but when performing the same reasoning task without semantic content, the parietal system was recruited).


114. Interview with R. McKell Carter (Carston), Assistant Professor, Univ. of Colo. Boulder, in Boulder, Colo. (Jan. 19, 2016) (“There is no evidence of a strong bilateral bias in brain functioning. Language may prove an exception as it is left lateralized with subtle bias effects. Social processing occurs more frequently on the right side of the brain but the left side is still engaged, albeit minimally.”).

Such complexities make applying neuroscience data to the field of law risky. In legal scholarship, we frequently aim to describe a phenomenon and then prescribe a solution to fix the problem or gap in understanding. Our claims are often precise and bold. Research in neuroscience however, is more cautious because it studies what the brain (or a set of brains) do under certain conditions.116 For this reason, one particular study cannot claim to represent the workings of brains in general. Where enough studies, or a meta-analysis, confirm similar findings, the specific inferences gain confidence in what they say about many or most brains.117 Responsible use of the data requires seeking multiple verifications that confirm a central insight. This is the approach used in neuroscience. Thus, in the sections that follow, I do not advance claims about all judges or people and their brains but, instead, provide insights about why a person may behave a certain way based on general inferences from brain-behavior research.

B. How Brains Decide

The behavior that we commonly understand as decision-making involves a variety of cognitive functions in our brains. Neuroscience has produced exciting evidence-based understandings about these functions.118 From this perspective, your mind and your brain are functionally the same.119 Thus, decisions are made in your brain, not by a separate mind.120 By measuring which parts of the brain become active during different types of activity and thought, neuroscientists have added to these understandings in important ways.

116. See, e.g., Oshin Vartanian & David R. Mandel, Introduction to NEUROSCIENCE OF DECISION MAKING, supra note 25, at 1, 3 (“We endeavor to show that current behavioral and neural evidence supports the assertion that the field has entered a stage in which context-dependence of choice must be seen as central to decision theory and as something that cannot be ignored without incurring a severe loss of explanatory completeness.”).

117. For books that gather insights in neuroscience and across cognitive sciences, see, e.g., THE CAMBRIDGE HANDBOOK OF HUMAN AFFECTIVE NEUROSCIENCE (Jorge Armony & Patrik Vuilleumier eds., 2013) (providing, as described in the preface, “a comprehensive, up-to-date, and authoritative survey of knowledge and topics investigated” in the field of affective neuroscience or the cognitive neuroscience of human emotion).

118. See generally Eben Alexander, PROOF OF HEAVEN: A NEUROSURGEON’S JOURNEY INTO THE AFTERLIFE 8 (2012) (stating how neuroscience helps to learn more about the modern brain as well as helping heal people); Norman Dodge, THE BRAIN THAT CHANGES ITSELF (2007) (discussing how the neuroplastic revolution has implications on different aspects of human life); Michio Kaku, THE FUTURE OF THE MIND 4 (2014) (noting the movement to understand how the human brain functions); Tara Swart ET AL., NEUROSCIENCE FOR LEADERSHIP: HARNESING THE BRAIN GAIN ADVANTAGE 2 (2015) (describing how the brain and decision-making processes work together); Matthew Wilcox, THE BUSINESS OF CHOICE: MARKETING TO CONSUMERS’ INSTINCTS 11–12 (2015) (detailing the three trends of decision science which resulted in an “explosion of learning from behavioral and social sciences . . .”).

119. Paro & Patterson, supra note 91, at 20 (cautioning that the two differ conceptually, and identifying a “mereological fallacy” defined as the conflation of a whole person with a part of the brain).

First, there is no unitary process in the brain for making decisions. Instead, when our brains engage in decision-making, they invoke multiple regions and circuits, often in sequence or at the same time to engage in judgment and choice. This idea was popularized by psychologist Daniel Kahneman in his description of two systems of thought in the human brain: System 1 is quick and automatic, and System 2 is slow and more complex.

Neuroscience has taken the story further. Cognitive functions that develop decisions occur at the same time as those that inform emotions and interactions between the two influence the choices one makes. This approach, theorized as non-linear systems analysis, holds that internal states of cognition can activate at the same time and coexist. Thus, under this view, human cognition is a dynamic interaction between internal brain processes. The brain has the capacity to engage in parallel cognitive processes such as perceiving and choosing at the same time, and such processes can interact with each other in the brain.

122. Id.
123. Daniel Kahneman, Thinking, Fast and Slow 21–23 (2011); see also Daniel Kahneman, A Perspective on Judgment and Choice: Mapping Bounded Rationality, 58 AM. PSYCHOLOGIST 697, 698–99 (2003) (“The operations of System 1 are typically fast, automatic, effortless, associative, implicit . . . . The operations of System 2 are slower, serial, effortful, more likely to be consciously monitored and deliberately controlled . . . .”); Amos Tversky & Daniel Kahneman, Judgments of and by Representativeness, in JUDGEMENT UNDER UNCERTAINTY: HEURISTICS AND BIAS, supra note 60, at 84, 85–98.
124. Cognition is not easily defined as automatic versus non-automatic as many processes feature some aspects of both. See Jan De Houwer & Dick Hermans, Do Feelings Have a Mind of Their Own?, in COGNITION & EMOTION: REVIEWS OF CURRENT RESEARCH AND THEORIES 28 (Jan De Houwer & Dick Hermans eds., 2010) (“Evidence from Stroop studies, for instance, suggests that the processing of word meaning is automatic in that it does not depend on intention, resources or time, but at the same time occurs only when attention is directed toward the word. An important implication of this conclusion is that one cannot simply characterise a process as automatic or non-automatic.”).
125. See, e.g., Antoine Bechara et al., Different Contributions of the Human Amygdala and Ventromedial Prefrontal Cortex to Decision-Making, 19 J. NEUROSCIENCE 5473, 5473 (1999) (discussing how the ventromedial prefrontal cortex and the amygdala affect different processes).
126. De Houwer & Hermans, supra note 124, at 43 (“Automatic affective processing (not mediated by controlled cognitive processing) can occur independently of automatic cognitive processes challenging the view that there were two systems of processing in the brain – the non-automatic and the automatic.”).
127. Song & Nakayama, supra note 27, at 360.
128. For studies investigating parallel cognitive processes, see Alon Fishback & F.A. Mussa-Ivaldi, Seeing Versus Believing: Conflicting Immediate and Predicted Feedback Lead to Sub-Optimal Motor Performance, 28 J. NEUROSCIENCE 14140 (2008) (“Under normal conditions, perceptual and motor criteria for movement optimization coincide. However, when vision is perturbed adapted trajectories can be used to uncover the influence of perceptual criteria on movement planning . . . .”); Hongbao Li et al., Prior Knowledge of Target Direction and Intended Movement Selection Improves Indirect Reaching Movement Decoding, BEHAVIORAL NEUROLOGY, 2017, at 1 (“Recruiting prior knowledge about target direction and intended movement selection extracted from the Dorsal Pre-Motor Cortex could enhance the decoding performance of hand trajectory in indirect reaching movement.”); Song & Nakayama, supra note 27 (“[T]his line of research provides new opportunities to integrate information across different disciplines such as perception, cognition and action, which have usually been studied in isolation.”); Michael Spivey et al., Do Curved Reaching Movements Emerge from Competing Perceptual Principles?, 26 J. EXPERIMENTAL PSYCHOL. 251 (2009) (referring to a quantitative simulation of reaching
are reaching for a hamburger but a yellowjacket lands on top of it, your brain now has to redirect its thought to account for action (reaching) and perception (seeing a threat) at the same time. This kind of research revises the earlier view that the brain processed information sequentially and demonstrates the complexity of cognitive processes involved in decision-making. It also challenges the traditional view in law that we can make decisions using only logical reasoning.

Second, decision-making often occurs with the explicit aim of achieving a pre-set goal. When faced with making an important decision, we try to focus on the objective and stay on task. From a neuroscience perspective, this activity is called goal-directed thought.129 When we engage in it we are utilizing our pre-frontal cortex, which optimizes its ability to focus attention on relevant stimuli, and this is a process called cognitive control.130 In a crude sense, focusing on making a decision helps our brains reduce the influence of distracting stimuli.

However, as is true with most findings in neuroscience, the story about thought and the brain is more complex. Who hasn’t had their mind wander during a meeting, no matter its importance? Understanding why this happens requires inquiring about what happens inside the brain. Known as spontaneous thought, our brains tend to prefer the “default network” when we are not engaging in attention-demanding activities. Many of us experience this network as our thoughts drift right before we fall asleep at night. One possible benefit of such de-focused thought is its potential for maximizing memory consolidation due to the brain’s increased capacity to access long-term memories during spontaneous thought.132

A third complexity involves how brains process creative thought. The current understanding is that such thought is associated with activity in the prefrontal cortex, the “default network,” and memory networks.133 Studies about creative thought work to identify how to improve creative problem-solving capacity. For example, in a 2005 study, people solved anagrams more quickly when they were lying down than when they were standing up.134 In another study from 2002, people who were awakened from rapid eye movement (REM) sleep were better able to

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129. Kalina Christoff et al., The Role of Spontaneous Thought in Human Cognition, in NEUROSCIENCE OF DECISION MAKING, supra note 25, at 261.
130. Id. at 261–63.
131. Id. at 263 (attributing the findings of the brain’s “default network” to Marcus E. Raichle et al., A Default Mode of Brain Function, 98 PROC. NAT’L ACAD. SCI. 676 (2001)).
132. Id. at 264 (“These findings suggest that long-term memory processes contribute strongly to the phenomenon of spontaneous thought . . . memory consolidation may be one of the main functions of spontaneous thought.”).
133. Id. (“Divergent thinking tasks produce decreased beta range synchrony and increased alpha range synchrony over the frontal cortex . . . providing evidence for loosened cognitive control and lower prefrontal cortical arousal during creative thought.”).
134. Id. at 264–65 (attributing the study by D.M. Lipnicki & D.G. Byrne, Thinking on Your Back: Solving Anagrams Faster when Supine than when Standing, 24 COGNITIVE BRAIN RES. 719 (2005)).
solve anagrams than those awakened from non-REM sleep. As such studies evolve, so do the applicable findings. However, there is enough evidence to suggest that creative problem-solving and goal-directed decision-making recruit different brain processes and regions. Asking people to do both at the same time may not be recommended. Furthermore, the prescription for optimal decision-making just might mean more naps and more daydreaming. Recognizing the various types of thought from a neurological perspective allows for a deeper appreciation of how memory, emotion, motivation, and other factors work in complex and diverse ways to influence decision-making.

Imagine a case in which the judge must engage in information assessment and problem-solving in order to settle the dispute. We might assume that the judge engages in the same type of thought process for both. A judge may think she or he does as well. However, neuroscientists are beginning to study the timeline of cognitive processes associated with decision-making activity in the brain thanks to advances in new techniques. Directing oneself to think about solving a problem can involve a series of steps.

For example, one fMRI study where participants were trying to solve a math problem, identified four stages of cognitive processes: encoding, planning, solving and responding. But a brain engaged in assessing information and thinking about how valid the facts are, for example, might engage in a different order of cognitive processes. This study advanced a new method for identifying the cognitive stages a person engages when they are planning or problem-solving. Though one study is not indicative of a unified theory of cognitive thought, it does illustrate an important point. The ability to study decision-making activity in the brain in stages reveals that the brain can invoke different regions and different networks that may differ depending on whether a person is trying to assess information or solve a problem.

III. IMPLICIT COGNITION IN HUMAN CHOICE

Teaching leaders, companies, and students how to make smart decisions is a multi-billion-dollar industry. From TED Talks to guru-led training seminars to best-selling books, there are many self-designated experts on decision-making in the professional world. The dominant focus is on aspects of our decision-making behavior of which we are aware (or after taking the seminar, can become aware). But not all the ways in which we behave are knowable. Sometimes we do not know why we behave the way we do, such as engaging in mimicry or mirroring another's

135. Id. at 265 (attributing the study of REM sleep versus non-REM sleep to M.P. Walker et al., Cognitive Flexibility Across the Sleep-Wake Cycle: REM-Sleep Enhancement of Anagram Problem Solving, 14 COGNITIVE BRAIN RES. 317 (2002)).
136. Id.
137. John Anderson et. al, Hidden Stages of Cognition Revealed in Patterns of Brain Activation, 27 PSYCHOL. SCI. 1215 (2016).
138. Id.
body language.140 Because our mental activity is connected to our neurobiological brain and we are just beginning to understand the brain’s complexity, much remains hidden. This means our brains can weave together assessments of information and memories that shape our judgment and our emotions to produce a decision without us being aware of it. Although we are aware of our decision or choice, we are not aware of the way our brain reached that choice because aspects of our cognition, such as memory, perception, knowledge, and emotion, can be implicit, meaning that their influence on our behavior occurs at the unconscious level.141 There are “hidden internal events” that indicate that “human action is not always the final product of perception and cognition.”142 This is implicit cognition.143

Implicit cognition in our memory, judgement, and perception influences the choices we make in ways in which we are not aware.144 To better understand decision-making we need to account for many kinds of implicit cognition that can influence our choices.145 Part III explores three: bias, emotion, and empathy.146

A. Bias-Cognition Interactions

Aspects of our higher cognition include the mental activity we engage in when we formulate decisions, make choices, assess information, and judge. It is now clear among neuroscientists who study such subjects that various regions of our brain, and neural circuitry that connects them, engage in cross-talk when we decide, make


143. See PATRICIA CHURCHLAND, TOUCHING A NERVE: OUR BRAINS, OUR SELVES 197–98 (2013) (describing the concept of “hidden cognition” from a psychological perspective and discussing the distinctions between conscious, unconscious, subconscious, and nonconscious); TIAN E. MCMULLIN, THE NEW HANDBOOK OF COGNITIVE THERAPY TECHNIQUES 68 (2000) (“The third cognition between emotion and behavior is a belief I call the hidden cognition. It is hidden because most clients are not aware of its existence. The [hidden belief] occurs after clients feel an emotion, but immediately before they engage in a behavior . . . . Most clients don’t notice this cognition because it is so rapid. They experience it as a vague impression, an undigested conception often occurring before they can put it into words.”).

144. CHURCHLAND, supra note 26, at 224 (“The more I learned about nonconscious processes in the brain and how they seamlessly interweave with conscious processes, the more I began to realize that to understand consciousness, we need to understand more about those nonconscious processes.”).


146. One could explore the hidden cognition of perception, learning, comprehension, and many other features, which are beyond the scope of this Article.
a choice or change our mind.\textsuperscript{147} Generally speaking, this is the reason why our biases can influence our cognition at the neural level.

In generic terms, a bias is a preference for or aversion against something. We can be aware of such preferences or explicit bias, and we can have them unknowingly as implicit bias.\textsuperscript{148} This includes the so-called cognitive biases such as confirmation bias, anchoring, and hindsight bias.\textsuperscript{149} These biases are often identified and evidenced through behavioral science observations about how people behave under specific conditions.

In the context of judicial behavior, I focus on the biases that people often understand as being related to racism, sexism, homophobia, and other forms of discrimination. These are particularly concerning biases for a judge to acknowledge because judges take an oath to perform their judicial function impartially. Therefore, acknowledging that one’s decision-making is prone to bias based on race, gender, sexual orientation, and other aspects of identity conflicts with the notion of judicial impartiality.

The impact of bias in the legal profession is widespread yet poorly understood and acknowledged. Recent scholarship on bias in law aims to change that. For example, biases related to a judge or jury’s views about a defendant are believed to increase the risk for wrongful convictions.\textsuperscript{150} Take cases where people report a criminal act such as robbery with black men or demonstrate a “shooter bias.”\textsuperscript{151} Studies in social psychology, notably from the Implicit Association Test, support a general inference that racial bias is real.\textsuperscript{152} This builds upon earlier work showing the prevalence of racial profiling in police stops.\textsuperscript{153} Despite the sustained evidence


of bias in the courtroom and in the legal profession, serious acknowledgment and redress are, still, lacking.154

This is where neuroscience may provide an invaluable contribution to the discourse. No one wants to be labeled racist, sexist, or homophobic yet the biases connected to such discriminatory behavior are real. In order to move from description to prescription and remedy, people need to understand why bias of this sort occurs and what to do about it. Neuroscience helps us understand bias as a form of implicit cognition that can influence our thought without us realizing it. In other words, neural mechanisms in our brains can help explain what occurs in a case of racial bias, for example.

Using brain imaging techniques, neuroscience researchers have long studied the amygdala for its importance in activity associated with fear and other human emotions.155 Studies on racial bias, the most frequently studied type of bias, have linked amygdala activity to racial prejudice.156 A 2014 review of fMRI studies on emotion and prejudice suggests, once again, that the amygdala is of high importance.157 The study goes further to argue that activity in this area of the brain may be attributed to a person perceiving a threat that arises from negative cultural associations with black men and other groups.158 One early, yet important, implication of this work is the significance of neural activity associated with in-group and out-group behavior.159 Here, race, sex, gender, age, and more all become factors in how we perceive and assess a person. Where his or her identity is of an out-group and one that has historically or culturally been associated with negative traits, we process such perceptions and biases in our amygdala, which is where we also process fear.160

The implications of studies like these, which continue to evolve, are relevant to the discourse taken up in this Article about evidencing judicial bias through