

# Neuroscience and Settlement: An Examination of Scientific Innovations and Practical Applications

RICHARD BIRKE\*

## I. INTRODUCTION

Neuroscience, and neuroimaging in particular, holds the promise to allow unprecedented access to the mechanisms of the brain as it considers information and makes decisions.<sup>1</sup> This newfound ability to literally peer into the brain while it assimilates information, makes decisions, and evaluates offers creates unparalleled opportunities to advance our understanding of the reasons why some disputes settle and others do not.<sup>2</sup>

Neuroscience has become the object of quite a bit of attention in the scientific and popular press, and expectations are high that new technological advances will result in important practical advances in the way we interact with each other and the way we make decisions. Many books have been written in the past few years that are the products of good journalists reporting about the work of important neuroscientists, and by neuroscientists who are blessed with the storyteller's gift.<sup>3</sup> The public's longing for hard,

---

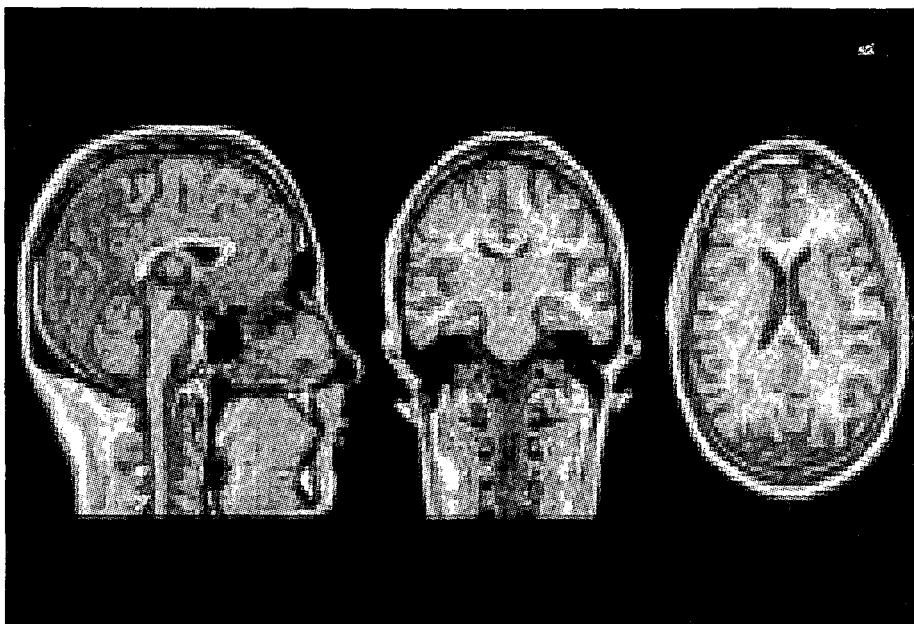
\* Associate Professor of Law, Willamette University College of Law; Director, Willamette Center for Dispute Resolution. Thanks to the faculties of the Duke University Cognitive Neuroscience Department, the Arizona State University law school, the American Bar Association, the Master Mediators Institute, the Oregon Mediation Association and the Washington Bar Association for providing opportunities to workshop the research that culminated in this article.

<sup>1</sup> The notion that the brain considers information or makes decisions is controversial, with most scientists and philosophers in agreement that there is a brain-mind distinction. From Descartes (cogito, ergo sum) to the thinkers of our time, the brain has been considered the mechanism of the mind, but not its container. References in this article to the brain as an active decisionmaker are meant to serve as shorthand, not as scientific stance. For purposes of this article, it will be irrelevant whether the brain is doing the driving, whether a mind outside the brain is doing the driving or whether there is, in fact, a "Ghost in the Machine." See GILBERT RYLE, *THE CONCEPT OF MIND* 15-16 (1949); see also Keith A. Johnson, *A NeuroImaging Primer*, <http://www.med.harvard.edu/AANLIB/hms1.html> (last visited Nov. 26, 2009).

<sup>2</sup> One new moniker for the emerging field is "decision neuroscience." See Baba Shiv et al., *Decision Neuroscience*, 16 *MARKETING LETTERS*, 375-86 (2005).

<sup>3</sup> See, e.g., MALCOLM GLADWELL, *BLINK* (2005); DANIEL GOLEMAN, *SOCIAL INTELLIGENCE* (2006) (focusing in part on the work of Joseph LeDoux); MARCO IACABONI, *MIRRORING PEOPLE* (2008); JOSEPH LEDOUX, *THE EMOTIONAL BRAIN* (2008); DAVID LINDEN, *THE ACCIDENTAL MIND: HOW BRAIN EVOLUTION HAS GIVEN US LOVE, MEMORY, DREAMS, AND GOD* (2008); DREW WESTEN, *THE POLITICAL BRAIN: THE ROLE OF EMOTION IN DECIDING THE FATE OF THE NATION* (2007).

physical, scientific explanations for behavior and the seductive quality of photographic evidence combine to fuel the desire to convert laboratory data into daily practice. Neuroscience is so promising in part because the kind of biological data produced are qualitatively different from those produced by the traditional fields employed by students of decisionmaking, namely economics and psychology. Unlike these fields, neuroscience comes with pictures—pictures of brains caught in the act of making decisions.



Negotiators and mediators are among those who hope that neuroscience can make them better at what they do. While economics, psychology, and cultivated self-awareness have all contributed mightily to understanding negotiation, each of these modes of analysis suffers from inherent limitations. In classes, books, articles, and continuing education workshops, negotiators and mediators study game theory (notably the “prisoner’s dilemma”) and utility maximization (under the banner of “value creation”).<sup>4</sup> Neoclassical economic principles inform all decision theory, but the

---

<sup>4</sup> DOUGLAS G. BAIRD ET AL., *GAME THEORY AND THE LAW* 11 (1994); ROGER FISHER & WILLIAM URY, *GETTING TO YES* (1981); David Lax & James Sebenius, *Claiming Value*, in *THE MANAGER AS NEGOTIATOR* 117, 117–53 (1986); Ronald J. Gilson, *Value Creation by Business Lawyers: Legal Skills and Asset Pricing*, 94 *YALE L.J.* 239, 243 (1984); Cf. Gerald B. Wetlaufer, *The Limits of Integrative Bargaining*, 85 *GEO. L.J.* 369 (1996).

foundation provided by the rational actor model has come increasingly under attack, and economics is sometimes dismissed as sterile and unrealistic. Cognitive and behavioral psychology have contributed at least thirty-five distinct principles that impact the way lawyers negotiate, including such prominent contributions as loss aversion and prospect theory.<sup>5</sup> With each passing year, they contribute more. This field's limitations may be related to its successes—principles of psychology mapped in isolation offer little help to the dispute resolver who encounters them in combination. Studying decisions by studying oneself takes the form of negotiation journals, reflection memoranda, self-diagnostics such as the Thomas-Kilmann Conflict Mode Instrument or the Myers-Briggs test, and mindfulness.<sup>6</sup> The ubiquity of simulation-based negotiation and mediation training, the prevalence of reflective writing assignments in classes, and the pervasive interest in skill building in areas related to creativity, listening, and neutrality are three testaments to the interrelationship between consensual dispute resolution and interpersonal skill building.<sup>7</sup> However useful interpersonal skill building may be to understand the mental process of decisionmaking, it is necessarily limited by intersubjectivity. No comprehensive registry catalogues what is common and what is eclectic. Thus, despite contributions from economics, psychology, and self-study, negotiators and mediators still want perspective on how and why people make decisions under conditions of risk and uncertainty.

---

<sup>5</sup> Originally discussed in 1738, Daniel Bernoulli's solution to brother Nicolas' "St. Petersburg Paradox" illuminated such matters as why gamblers bet less when they are "up" and why marginally diminishing returns give rise to a decreasing sensitivity to gains. Daniel Bernoulli & Amos Tversky, *Exposition of a New Theory on the Measurement of Risk*, 22 *ECONOMETRICA* 23, 23–35 (1954); Daniel Kahneman & Amos Tversky, *Prospect Theory: An Analysis of Decision Under Risk*, 47 *ECONOMETRICA* 263 (1979).

<sup>6</sup> See KENNETH W. THOMAS & RALPH KILLMAN, THOMAS-KILLMAN CONFLICT MODE INSTRUMENT (2009), available at <http://www.kilmann.com/conflict.html>; see also Leonard L. Riskin, *Mindfulness: Foundational Training for Dispute Resolution*, 54 J. LEGAL EDUC. 79 (2004); Leonard L. Riskin, *The Contemplative Lawyer: On the Potential Contributions of Mindfulness Meditation to Law Students, Lawyers, and Their Clients*, 7 HARV. NEGOT. L. REV. 1 (2002); The Myers & Briggs Foundation, MBTI Basics, <http://www.myersbriggs.org/my-mbti-personality-type/mbti-basics> (last visited Nov. 25, 2009).

<sup>7</sup> Becky L. Jacobs, *Teaching and Learning Negotiation in a Simulated Environment*, 18 WIDENER L. REV. 91 (2008); Philip G. Schrag, *The Serpent Strikes: Simulation in a Large First-Year Class*, 39 J. LEGAL EDUC. 555 (1989); Gerald Williams, *Using Simulation Exercises for Negotiation and Other Dispute Resolution Courses*, 34 J. LEGAL EDUC. 307, 311–12 (1984).

It is, therefore, no mystery why decisionmakers have turned a hopeful eye toward neuroscience.<sup>8</sup> Recent scientific advances have enabled a new and radically different approach to studying the process of decisionmaking. In particular, the innovation that is most likely to lead the great leap forward is the functional magnetic resonance imager (fMRI). Employing powerful magnets that react to minute differences in levels of oxygenated and deoxygenated hemoglobin in the brain, the fMRI can create near-moving pictures that allow studying the location, intensity, and duration of brain activity under conditions similar to those found during negotiation and mediation. The data collected by fMRI holds the potential to add significantly to the understanding of how to negotiate and mediate more effectively. The desire to obtain visual data about the brain has led the fMRI

---

<sup>8</sup> Unfortunately for dispute resolvers and others interested in areas of law other than criminal, the overwhelming bulk of the legal literature devoted to neuroscience has been devoted to the area of criminal responsibility. A Westlaw search conducted on May 23, 2009 looking for the term “neuro” in the title of all law reviews and journal articles turned up 135 responses. Of these, well more than half deal exclusively with criminal responsibility, and of the remainder, most deal with childhood development or issues related to medicine. As of this writing, virtually no attention has been paid to neuroscience and dispute resolution. There are, thankfully, some entries into the field, but they are few and far between. For one notable exception, see Kenneth Cloke, *Bringing Oxytocin into the Room: Notes on the Neurophysiology of Conflict*, MEDIATE.COM, Jan. 2009, <http://www.mediate.com/articles/cloke8.cfm>.

Another notable exception is Owen Jones, who is both a law professor and a neuroscientist. He is emphatic that biology be included in discussions about decision theory. In 2000, he wrote:

[T]heories of economics, sociology, psychology, philosophy, anthropology, and all the rest must be consistent, in the end, with the basic principles of biology.

The most basic principle of biology, in turn, is evolution—particularly evolution by natural selection. Natural selection occurs in any system in which there is differential reproductive success as a function of heritable variation. Put simply, any population of replicators, in which variations in heritable traits affect future replicative success, will tend, over generations, to accumulate an increasing proportion of traits that contribute to replicative success.

The power of this deceptively simple insight—and its ultimate relevance to law—lies in its ability to explain not only species-typical patterns of form, but also species-typical patterns of behavior (or what some people term a species-typical nature). More specifically, natural selection shapes the physical and chemical information-processing pathways of the brain in ways that have tended, over time, to contribute to the survival and reproductive success of organisms that bear them.

Owen D. Jones, *On the Nature of Norms: Biology, Morality and the Disruption of Order*, 98 MICH. L. REV. 2072, 2074 (2000).

## SCIENTIFIC INNOVATIONS AND PRACTICAL APPLICATIONS

to “quickly become the most prominent tool in cognitive neuroscience.”<sup>9</sup> Literally thousands of new experiments are performed each year.

The horizon may be full of promising avenues and existing data points, but the terrain is riddled with traps. There is reason for concern that interest in neuroscience may have already caused its applications to outpace the validity of the science.<sup>10</sup> The scientific community and the community of

---

<sup>9</sup> Russell A. Poldrack, *The Role of fMRI in Cognitive Neuroscience: Where Do We Stand?*, 18 CURRENT OPINION IN NEUROBIOLOGY 223, 223 (2008). “Since its invention in the early 1990’s to the end of 2007, more than 12,000 articles have been published that mention fMRI in the abstract or title, and this number is growing by roughly 30–40 papers every week.” *Id.*

The reasons why neuroscience is of current interest are many, but here are two that loom large. First, the use of fMRI machines by researchers who care primarily about decisionmaking, not medical diagnoses, is a relatively recent phenomenon. Where the first fMRI machines were both rare and expensive, they were reserved for intensive medical needs. As is the case with all technology, as time passed the price of the technology dropped, companies produced more fMRI machines, and the supply of machines expanded. With a little more market saturation, machines that are still quite expensive are nonetheless available for decision research. When brain activity can be recorded in real time, and then compared to known information gleaned primarily from studies of animal brains, brains of corpses, and especially from brains of people who suffered particular injuries to certain parts of the brain, decisions can be correlated with activity in sections of the brain. A researcher may then attempt to correlate the decision with the function, and known attributes of the functional area may be viewed as having a relationship with the decision.

Second, the fMRI presents the possibility of finding some objective, universal truths about behavior in a way that existing fields lack. Where interpersonal learning presents problems in determining which behaviors of the student are personal and which are universal, neuroscience may show that all brains (or most all brains) are alike in certain fundamental ways. Where economics traffics in behavioral aspirations, neuroscience tends toward a more agnostic approach, dealing in physical phenomena. There is no conflict between pure rationality and limited rationality—there are merely activated areas and correlated behavior and stimuli. Similarly, where psychology deals in tendencies and behaviors, the fMRI captures undeniable, unconcealable pictures of brain activity. If a physical connection can be established through observation of real time brain functions during decisions, there may be a set of universal behavioral prescriptions that will facilitate more effective decisionmaking than eclectic self-study, aspirational economics, or probabilistic psychology.

<sup>10</sup> George Annas writes:

It is, of course, the immediacy and seeming infallibility of pictures that make them simultaneously valuable and dangerous. Their potential to provide vivid and compelling, but simultaneously misleading, information is at the heart of many of the articles on neuroimaging in this issue. There is a rich history of utilizing ‘junk science’ to try to correlate brain structure with brain function, most compellingly illustrated by the rise and fall of phrenology.

practitioners are at odds over the readiness of neuroscience for broad application. One example concerns something called “Mirror Neurons.”<sup>11</sup> These neurons react in a sympathetic way to the neuronal expression of emotion by others. The viewer is purported to feel the emotion portrayed by the person whose face expresses the original feeling because the viewer’s mirror neurons line up in a similar magnetic pattern to those of the expresser. The idea that humans are “hard-wired for empathy” is a very attractive one for negotiators, mediators, and others whose livelihoods are based in part on their ability to empathize with others, and to create environments in which disputants may empathize with their opponent. Some researchers have developed mirror neuron based therapies at a time when many prominent neuroscientists are uncertain whether humans possess anything that can be properly called a mirror neuron.<sup>12</sup> Some scientists are downright derisive, penning articles with *Onion*-style satiric titles like, “Mirror Neurons May Be Responsible for Global Warming & U.S. Economic Woes.”<sup>13</sup>

A second cautionary example is found in technology that purports to prevent terrorist attacks, investigate crimes, and hire reliable workers. fMRI lie detection has been held up as a viable means of testing by at least two companies, while scientists argue that the data on fMRI lie detection fail to

---

George J. Annas, Foreword, *Imagining a New Era of Neuroimaging, Neuroethics and Neurolaw*, 33 AM. J. L. & MED. 163 (2007).

<sup>11</sup> IACABONI, *supra* note 3.

<sup>12</sup> See Ti-Fei Yuan & Robert Hoff, *Mirror Neuron System Based Therapy for Emotional Disorders*, 71 MED. HYPOTHESES 722 (2008). While I did not ask permission to include their names, I have asked more than a dozen prominent academic neuroscientists in various subdisciplines and in a variety of institutions on both coasts and in between about their opinions about mirror neurons. The most charitable thing I heard is that “Iacoboni is kind of alone out there on this,” to expressions of significant derision bordering on disgust. Not one person was willing to admit that there was proof or consensus that mirror neurons exist in humans.

That said, several very prominent and well-respected scientists endorse the book on its jacket. I am convinced that despite the opinions of the unnamed academics, there must be some there. In section IV.A, I spend more time with the idea of mirror neurons and its applicability to mediation. There I will discuss at somewhat greater length my cognitive dissonance with the opinions of the neuroscientists and my experience of reading Iacoboni’s book.

<sup>13</sup> Consider such actual *Onion* headlines as: *Report: Increasing Number of Educators Found to be Suffering from Teaching Disabilities*, THE ONION, May 25, 2009, available at [http://www.theonion.com/content/news/report\\_increasing\\_number\\_of](http://www.theonion.com/content/news/report_increasing_number_of). See also Antonia Demasio & Kaspar Meyer, *Behind the Looking Glass*, 454 NATURE 167 (2008).

support commercial claims.<sup>14</sup> The companies supporting fMRI lie detection promote the idea that the fMRI helps determine whether a subject is telling the truth or not; however, opposing scientists argue that the fMRI presents such vivid images that people impute too much weight to the research that accompanies the photographs. Vividness becomes a surrogate for validity.<sup>15</sup>

In the debate between those who would run with the data and those who encourage caution, count me among the hopeful that fMRI imaging and other recent advances in neuroscience will significantly advance our understanding of negotiation, mediation, and decisionmaking. However, my enthusiasm is tempered by fear of adopting beliefs based in data that may soon be debunked. In addition, the volume of research being conducted is overwhelming, and precious few of the thousands of studies conducted each year offer insights that are of immediate relevance to the rather limited (or refined) interests of the dispute resolution community.

Fortunately, neuro-decisionmaking books and articles have begun to permeate the popular press, and it is now possible for the interested layperson to engage in rigorous but accessible study. Over the course of several years, I have read popular books and neuroscience articles (some mainstream and others quite obscure), have attended many lectures, watched videos and heard news reports, attended a brain dissection, and observed fMRI and other types of brain scans. As a mediator, negotiator, and law professor by profession, and a neuroscience fan by avocation, this immersion feels like a small scratch on a vast surface. But I have learned enough to believe that neuroscience offers new insights into how individuals negotiate and mediate. My purpose in this article is to share some of what I have found so far in my examination of potential applications of recent advances in neuroscience to the practical and scholarly world of consensual dispute resolution, specifically mediation and negotiation.<sup>16</sup> I focus on work that has reached the popular press—these works are at once the most promising and the most

---

<sup>14</sup> Henry T. Greely & Judy Illes, *Neuroscience Based Lie Detection: The Urgent Need for Regulation*, 33 AMER. J. L. & MED. 377 (2007).

<sup>15</sup> David P. McCabe & Alan D. Castel, *Seeing Is Believing: The Effect of Brain Images on Judgments of Scientific Imaging*, 107 COGNITION 343 (2008); Deena Skolnick Weisberg et al., *The Seductive Allure of Neuroscience Explanations*, 20 J. COGNITIVE NEUROSCIENCE 470 (2008); Paul Bloom, *fMRI Images Have Captivated Headline Writers, Grant Committees and the Public Beyond Their Actual Scientific Worth: Seduced by the Flickering Lights of the Brain*, SEED, June 27, 2006, [http://www.seedmagazine.com/content/article/seduced\\_by\\_the\\_flickering\\_lights\\_of\\_the\\_brain](http://www.seedmagazine.com/content/article/seduced_by_the_flickering_lights_of_the_brain).

<sup>16</sup> While there are undoubtedly applications of these findings to legal advocacy, these are beyond the scope of this article. See, e.g., ROBERT B. CIALDINI, *INFLUENCE: THE PSYCHOLOGY OF PERSUASION* (1993); Bob Gibbins, *Closing Argument: Consolidating Your Theme*, in TRIAL BY JURY 1025 (2008).

likely to incite unwarranted applications. In focusing on both the promise and limitation of popular contemporary neuroscience, I hope to illuminate whether neuroscience has produced findings that form a sufficiently reliable basis for the transformation of mediation practice.

The remainder of this article consists of four sections. The first two sections are in the nature of background, one pertaining to decision theory in law—economics and psychology—and the other to a fuller explanation of the science of neuroscience. For readers conversant or uninterested in such background material, these sections can be skipped without much consequence; but for the uninitiated, they may prove helpful to understanding whether neuroscience is capable of making significant advances relative to pre-existing modes of inquiry. In the third section, I apply neuroscientific findings to a series of moments in a typical mediation (if such a thing can be said to exist). The phases and associated neuroscientific studies are as follows:

- Phase One—The Opening Statement: Mirror Neurons & Universal Facial Expression<sup>17</sup>
- Phase Two—Telling The Tale: Fear Networks And The Executive Function Of The Brain<sup>18</sup>
- Phase Three—Passing Information: Confirmation Bias & Reactive Devaluation In The fMRI<sup>19</sup>
- Phase Four—Thinking About Offers: Presentism And Problems Associated With Predicting State Of Mind<sup>20</sup>
- Phase Five—Closing In On The Deal: Loss Aversion And The fMRI<sup>21</sup>
- Last Ditch Efforts—Mediator Proposals: Invoking Involuntary Pleasure<sup>22</sup>

In the third section I will also draw out connections between the studies and the practices, and to accurately indicate how much support exists among the scientific community for a suggestion for practice.

In the final part of this article, I suggest that the inherent limitation of neuroscience to show exclusive causal effects between brain activity and

---

<sup>17</sup> See *infra* sec. IV.A.

<sup>18</sup> See *infra* sec. IV.B.

<sup>19</sup> See *infra* sec. IV.C.

<sup>20</sup> See *infra* sec. IV.D.

<sup>21</sup> See *infra* sec. IV.E.

<sup>22</sup> See *infra* sec. IV.F.



## SCIENTIFIC INNOVATIONS AND PRACTICAL APPLICATIONS

behavior constitutes a problem for the scientific researcher, but not for the practicing mediator. Problems associated with the separate study of neuroscience and legal decisionmaking might be overcome by creation of a dialogue designed to produce testable hypotheses that are of scientific interest, are amenable to scientific scrutiny of the highest level, but also have the most immediate impact to the lives of professionals vested with the responsibility of resolving conflict effectively.<sup>23</sup> I argue that mediators and negotiators ought to consider whether scientific standards of proof are appropriately applied to the practice of law, or whether a better standard or burden of proof might be one lower than that required for publication in a scientific journal but of sufficient explanatory power that it ought to be adopted as a guideline until proven unreliable. I dub the intermediate standard of proof “resonance.” I end with some modest offerings at testable hypotheses in hope to spark conversation between neuroscientists and the dispute resolution community.

## II. WHAT LAWYERS ALREADY KNOW ABOUT DECISIONMAKING

Every field stands on the shoulders of its predecessors, and were it not for economists trying to determine how to make good decisions and demonstrating how economic rationality must be relaxed to fit human decisionmaking, neuroscientists would have a scant idea of how to test decisionmaking in the fMRI.

As neuroscience owes a debt to economics and psychology, so does law. There are literally thousands of scholarly papers on law and economics, some of which have been awarded Nobel Prizes. Similarly, law journals are filled with contextual explorations of the work of great psychologists.

As a prelude to the discussion of new neuroscientific studies that fill section III of this paper, I now briefly describe relevant aspects of the fields of economics and psychology so that readers may accurately assess whether neuroscience has advanced decisionmaking, and if so, by how much. I also discuss some of the limitations of each field. None of these background sections is an attempt at an exhaustive survey of the fields; rather, I focus on the concepts that appear most regularly in dispute resolution courses and literature.

---

<sup>23</sup> Owen Jones has gone so far as to declare that “knowledge of human behavior must in the end be seamless between disciplines, [so] that the extraordinary growth of behavioral biology renders obsolete any law-relevant model of human behavior that fails to integrate life science perspectives with social science ones. . . .” Owen D. Jones, *The Evolution of Irrationality*, 41 JURIMETRICS 289, 293 (2001) (footnote omitted).

### A. Economic Concepts Impacting Negotiation and Mediation

From economics, decisionmakers have learned about expected value calculations and litigation risk analysis, as well as the Coase Theorem, game theory, utility maximization, and more.<sup>24</sup> Principles form the bedrock of much of our system of law, with the reasonable person standard embodied in tort law and principles of “highest, best use” utility maximization underpinning much of property law.<sup>25</sup> However, economics can be sterile and unrealistic. The “rational” person theory of decisionmaking is useful if people are rational, and of lesser value if they are not; ample evidence suggests that they are not. To the contrary, a robust literature demonstrates that three fundamental underpinnings of rational theory—context independence, description invariance, and process independence—are systematically violated when actual humans—as opposed to hypothetical rational decisionmakers—are in command of the decision.<sup>26</sup>

#### 1. Utility Maximization and Value Creation

In the late 1800s, neoclassical economics “replaced the individual economic agent as a sociological or historical datum by the utility-maximizing individual.”<sup>27</sup> The idea of an actor who sought, with every action and every decision, to increase his or her personal well-being became central

---

<sup>24</sup> For litigation analysis, see Richard Birke, *Decision Trees—Made Easy*, in LAWYER NEGOTIATION 160 (Jay Folberg & Dwight Golann eds., 2005); Marc B. Victor, *Litigation Risk Analysis<sup>TM</sup> and ADR*, in DONOVAN LEISURE NEWTON AND IRVINE ADR PRACTICE BOOK § 17 (John H. Wilkinson ed., 1990), available at [http://www.litigationrisk.com/Litigation%20Risk%20Analysis\(tm\)%20and%20ADR.pdf](http://www.litigationrisk.com/Litigation%20Risk%20Analysis(tm)%20and%20ADR.pdf); Marjorie Corman Aaron & David P. Hoffer, *Using Decision Trees as Tools for Settlement*, 14 ALTERNATIVES TO HIGH COST LITIG. 71, 71 (1996). For the Coase theorem, see Ronald H. Coase, *The Problem of Social Cost*, 3 J.L. & ECON. 1, 5 (1960). For the game theory, see Ronald J. Gilson & Robert H. Mnookin, *Disputing Through Agents: Cooperation and Conflict Between Lawyers in Litigation*, 94 COLUM. L. REV. 509 (1994). For utility maximization, see Anthony Ogus, *What Legal Scholars Can Learn from Law and Economics*, 79 CHI.-KENT L. REV. 383, 384 (2004).

<sup>25</sup> See, e.g., Nestor M. Davidson, *Property and Relative Status*, 107 MICH. L. REV. 757 (2009); Stephen G. Gilles, *On Determining Negligence: Hand Formula Balancing, the Reasonable Person Standard, and the Jury*, 54 VAND. L. REV. 813, 816–22 (2001) (discussing the history and use of this standard).

<sup>26</sup> Amos Tversky & Daniel Kahneman, *Introduction*, in JUDGMENT UNDER UNCERTAINTY: HEURISTICS AND BIASES (Daniel Kahneman et al. eds., 1982).

<sup>27</sup> George Stigler, *Does Economics Have a Useful Past?*, 1 HIST. OF POL. ECON. 217, 225 (1969).

## SCIENTIFIC INNOVATIONS AND PRACTICAL APPLICATIONS

to economic thinking. “[T]he rationality of neoclassical theory, assumes that the decisionmaker has a comprehensive, consistent utility function, knows all the alternatives that are available for choice, can compute the expected value of utility associated with each alternative, and chooses the alternative that maximizes expected utility.”<sup>28</sup>

In economics, rationality speaks not to particular preferences, but rather to decisions made to obtain such preferences. If a decisionmaker prefers ice cream to dollars, the economist casts no professional judgment of irrationality on the decisionmaker. However, mathematical rules apply to the judgment of all decisions. For example, the mathematical principle of transitivity dictates that if A is greater than B and B is greater than C, then A must be greater than C. So it is with preferences in economics: If a person prefers doughnuts to dollars and dollars to gold jewelry, then he must prefer doughnuts to gold jewelry, else he would be deemed irrational.

This idea of a rational maximizer found a home in law in the form of law and economics.<sup>29</sup> Utility maximizing economic thinking worked firmly to the very core of the American legal system—both in the education and administration of law.<sup>30</sup>

The concept of utility maximization also lies at the core of nearly all attempts to teach dispute resolution to law students and lawyers. The phrases “win-win” and “value-creation” are traceable to *Getting to Yes*, but regardless of whether this best-selling work is the origin or merely a widely-read rehash, the dominance of these ideas in American dispute resolution education can hardly be argued.<sup>31</sup> Economic models of decisionmaking touch the core of dispute resolution.

---

<sup>28</sup> HERBERT A. SIMON, AN EMPIRICALLY BASED MICROECONOMICS 17 (1997). While Simon is a critic of the rational school, his characterization of the classical economic actor is widely shared. *Id.*

<sup>29</sup> For a more thorough version of the history of law and economics, see THE ORIGINS OF LAW AND ECONOMICS: ESSAYS BY THE FOUNDING FATHERS 12 (Francesco Parisi & Charles K. Rowley eds., 2005); see also Edmund W. Kitch, *The Fire of Truth: A Remembrance of Law and Economics at Chicago, 1932–1970*, 26 J.L. & ECON. 163 (1983) (describing the history of the extraordinarily influential Chicago School of Law and Economics).

<sup>30</sup> See RICHARD A. POSNER, ECONOMIC ANALYSIS OF LAW (1977); Guido Calabresi, *Some Thoughts on Risk Distribution and the Law of Torts*, 70 YALE L.J. 499 (1961).

<sup>31</sup> ROGER FISHER ET AL., GETTING TO YES: NEGOTIATING AGREEMENT WITHOUT GIVING IN (2d ed. 1991).

## 2. *Expected Value Calculations and Valuing Forgone Trials*

Professor Marc Galanter reports that less than 1.8% of all filed cases result in verdicts.<sup>32</sup> When a lawyer is considering settlement value, he has little in the way of verdicts in comparable cases to use to help formulate a settlement range. Instead, valuation of trial results becomes either a matter of guesswork about one's opponent's reservation value or of considering risk, uncertainty, and value. These latter factors are amenable to combination as a decision tree, and in that form, have become a viable method for valuing litigation.<sup>33</sup>

However, risk analysis depends on one's ability to forecast with accuracy events that may not be easily predicted. Will a witness persuade a jury? Will a piece of evidence be admitted or excluded? If a jury returns a verdict, what amount will it be? While litigation risk analysis can help ballpark an offer, it suffers from problems related to inability to accurately forecast probabilities, from partisan tendencies to overvalue information confirming desired pre-existing hypotheses, and from pervasive overconfidence and optimism.<sup>34</sup>

While imperfect, litigation risk analysis is still widely taught, useful when used appropriately, and one more example of how economic forms of decisionmaking made their way into the practice of law and into the field of dispute resolution.

## 3. *Coase and the Relegation of Law to the Shadows*

In 1960 Ronald Coase proclaimed that in a world where the costs of bargaining are zero, legislative or judicial allocation of legal rights is near irrelevant to outcomes. A succinct summary of the Coase Theorem is that "[i]f there are no transaction costs in changing rights, the outcome will be

---

<sup>32</sup> Marc Galanter, *The Vanishing Trial: An Examination of Trials and Related Matters in Federal and State Courts*, 1 J. EMPIRICAL LEGAL STUD. 459 (2004); see also David P. Hoffer, *Decision Analysis as a Mediator's Tool*, 1 HARV. NEGOT. L. REV. 113 (1996).

<sup>33</sup> For examples of articles and practice tips, see *supra* note 24. See also James E. McGuire, *Practical Tips for Using Risk Analysis in Mediation*, in AMERICAN ARBITRATION ASSOCIATION HANDBOOK ON MEDIATION 139 (Thomas E. Carbonneau et al., eds., 2006); Eleanor Barr, *Making Sound Decisions: How to Help Your Client Evaluate Settlement Options*, 24 ALTERNATIVES TO THE HIGH COST OF LITIGATION 65 (2006); David P. Hoffer, *Decision Analysis as a Mediator's Tool*, 1 HARV. NEGOT. L. REV. 113 (1996).

<sup>34</sup> See *infra* pp. 507–10.

## SCIENTIFIC INNOVATIONS AND PRACTICAL APPLICATIONS

efficient by private agreements. Hence, the initial allocation of rights will not influence the efficiency of the final allocation.”<sup>35</sup>

This Nobel Prize winning work relegates law to second chair. Only when the law manages to impose hurdles to efficiency—long delays and high filing fees, for example—will law trump economics. In this regard, Coase shares a great deal with modern dispute resolvers—the law casts a shadow on negotiations, but the search for an agreement is generally influenced more by the costs and inefficiency of the legal process, not exclusively (or in some cases, primarily) on the endowments provided to the parties by the substantive law.<sup>36</sup>

### 4. *The Prisoner’s Dilemma*

In the classical prisoner’s dilemma, participants face a choice to cooperate or compete with a fellow player. The players have no means to make binding precommitments about their actions, and payoffs are dependent not only on the choices they make, but also on their partner’s choices as well. The hierarchy of payoffs is lead by a “temptation” payoff in which player one scores the most points if he competes in the face of player two’s cooperation. The second highest payoff occurs when both players cooperate. The next best payoff occurs when both players compete. The worst payoff for player one occurs when she cooperates and player two competes.

The “moral” of the prisoner’s dilemma is that in each round, when faced with a decision to cooperate or compete, each player does better if he competes, no matter what the other player does. However, if both players follow this logic, at the result is a stable but suboptimal outcome. The lessons from the prisoner’s dilemma are typically either that players should engage in repeat play with no known end and a looming future, or that they should contract around the incentives to compete.<sup>37</sup>

---

<sup>35</sup> MICHAEL FAURE & GÖRAN SKOGH, *THE ECONOMIC ANALYSIS OF ENVIRONMENTAL POLICY AND LAW: AN INTRODUCTION* 143 (2003).

<sup>36</sup> See Jones, *supra* note 8, at 2100–01.

<sup>37</sup> See generally ROBERT AXELROD, *THE EVOLUTION OF COOPERATION* (Basic Books 2006) (1984). The necessary requirements of a prisoner’s dilemma game are that the players cannot communicate or bind each other to commitments, each must choose to cooperate or compete and the payoffs are as described in the text. Often referred to as the “temptation, reward, punishment and sucker’s” payoffs, a PD only exists if  $(T+S/2) < R$ . Stated another way, if the players do better by alternating between being “suckered” and “suckering” each other, the game is not a prisoner’s dilemma because there is no tension between working together and competing.

However, the lessons of the prisoner's dilemma are more obscure in real life, where noise makes it difficult at times to discern cooperation from competition, and indeed, where context may matter more than incentives.<sup>38</sup>

### 5. Limitations

Rationality, in the strict, old-school sense of a robotic and effective utility maximizer, has fallen off its pedestal. Critics are now more prominent than proponents. For example, prolific law scholars such as Cass Sunstein have become champions of this new approach to law and economics.<sup>39</sup> This newer approach considers that the rationality assumption needs to be reconsidered and revised to accommodate the understanding gleaned from hundreds of observed deviations from classical rationality.<sup>40</sup> This new field called "Behavioral Law and Economics" has resulted in a plethora of books and articles, and even a new section in the Association of American Law Schools.<sup>41</sup> According to Professor Richard Epstein, "[t]here is little doubt that the major new theoretical approach to law and economics in the past two decades does not come from either of these two fields. Instead it comes from the adjacent discipline of cognitive psychology, which has now morphed into behavioral economics."<sup>42</sup>

Whether behavioral law and economics and the relaxation of the rationality assumption leads to significant advances in our understanding of conflict is uncertain. But the existence of the new hybrid field stands as evidence of both the value and limitations of economics as an exclusive or

---

<sup>38</sup> See Lee Ross & Andrew Ward, *Naïve Realism in Everyday Life: Implications for Social Conflict and Misunderstanding*, in VALUES AND KNOWLEDGE 103 (Edward S. Reed et al., eds., 1996).

<sup>39</sup> See BEHAVIORAL LAW AND ECONOMICS (Cass Sunstein ed., 2000).

<sup>40</sup> RICHARD H. THALER, QUASI-RATIONAL ECONOMICS (1991).

<sup>41</sup> *Id.*; see also DAN ARIELY, PREDICTABLY IRRATIONAL: THE HIDDEN FORCES THAT SHAPE OUR DECISIONS (2008); RICHARD H. THALER & CASS R. SUNSTEIN, NUDGE: IMPROVING DECISIONS ABOUT HEALTH, WEALTH, AND HAPPINESS (2008); Christine Jolls et al., *A Behavioral Approach to Law and Economics*, 50 STAN. L. REV. 1471 (1991); Russell B. Korobkin & Thomas S. Ulen, *Law and Behavioral Science: Removing the Rationality Assumption from Law and Economics*, 88 CAL. L. REV. 1053 (2000); Thomas S. Ulen, *The Growing Pains of Behavioral Law and Economics*, 51 VAND. L. REV. 1747 (1998); The Association of American Law Schools, Section on Socio-Economics, [https://memberaccess.aals.org/eWeb/dynamicpage.aspx?webcode=ChpDetail&chp\\_cst\\_key=fba7ea6a-79e6-4e32-bd3b-fc67251cfc86](https://memberaccess.aals.org/eWeb/dynamicpage.aspx?webcode=ChpDetail&chp_cst_key=fba7ea6a-79e6-4e32-bd3b-fc67251cfc86) (last visited Nov. 25, 2009).

<sup>42</sup> Richard A. Epstein, *The Neoclassical Economics of Consumer Contracts*, 92 MINN. L. REV. 803, 803 (2008).

## SCIENTIFIC INNOVATIONS AND PRACTICAL APPLICATIONS

complete model of decisionmaking.<sup>43</sup> Even Coase has been subjected to analysis by behaviorally-oriented lawyers, and the clear result of this analysis is that a formerly economically-oriented model of decisionmaking has become one in which psychology plays a prominent, if not dominant role. The Nobel Prize in Economics won by psychologist Daniel Kahneman in 2002 signifies the importance of psychology to economic decisionmaking.<sup>44</sup>

### *B. Psychological Concepts in Negotiating and Mediating Legal Claims*

Modern scholarly interest in the application of psychology to legal decisionmaking may have originated with the publication of *Bargaining in the Shadow of the Law*, in which Professors Robert Mnookin and Lewis Kornhauser discussed how uncertainty, risk attitudes, eclectic preferences, and party reactions to the behavior of others impacted the settlement of cases.<sup>45</sup> Professor Mnookin moved the conversation forward when he founded and directed the Stanford Center on Conflict and Negotiation in the late 1980s and early 1990s, bringing together psychologists like Amos Tversky and Lee Ross with economists such as Kenneth Arrow, and discussing the relevance and application of their work to law and business. They and their students began an effort that has resulted in thousands of law review articles built on psychological critiques of conventional doctrinal analyses of individual cases.<sup>46</sup>

---

<sup>43</sup> See generally Symposium, *Must We Choose Between Rationality and Irrationality?*, 80 CHI.-KENT L. REV. 1043 (2004).

<sup>44</sup> See, e.g., Korobkin & Ulen, *supra* note 41, at 1110; All Laureates in Economics, [http://nobelprize.org/nobel\\_prizes/economics/laureates](http://nobelprize.org/nobel_prizes/economics/laureates) (last visited Nov. 26, 2009).

<sup>45</sup> Robert H. Mnookin & Lewis Kornhauser, *Bargaining in the Shadow of the Law: The Case of Divorce*, 88 YALE L.J. 950 (1979).

<sup>46</sup> My look at how the field of ADR in Law became infused with decisionmaking goes back only a few years. This history is curt and subject to debate, but in my view, it happened like this.

As a student, Robert Mnookin studied economics and law, but in his early career as an academic, he focused on family law—where he must have come to understand the role of psychology in the dialogue. Later, while a professor at Stanford, he enlisted Arrow, Ross, Tversky, and Wilson, with occasional help from Janet Alexander and Ian Ayres, to start the Stanford Center on Conflict and Negotiation and the first serious attempt to incorporate psychology into legal ADR theory. This all occurred when the Hewlett Foundation provided funding for academic dispute resolution programs (Harvard's PON was another beneficiary, as were the Oregon and Ohio Dispute Resolution Commissions). In the early 1990s, there was money available for organization and support for graduate study in conflict resolution.

As an illustration of the robust impact of psychology on law (and perhaps as a useful organizing tool for dispute resolvers interested in psychology), I offer the following list of principles that have been studied first by psychologists, and then adapted over to discussion in law and a few that have not, to my knowledge, been listed in print before in a law journal, but which deserve mention.<sup>47</sup>

The list is divided into two categories meant to describe the general categories of activities lawyers engage in when preparing cases for settlement: evaluation and persuasion. While some principles impact both activities, each is filed by whether it primarily impacts the mind of the negotiator “in a vacuum” or the negotiator actively involved in the give-and-take of negotiation. Broadly speaking, the first set of principles is implicated when putting a value on a claim or choosing a negotiation strategy, and the second set involves convincing others to accept the correctness of the evaluation. The descriptions are in my own vernacular—original or important works are cited for readers who seek less colloquial renditions, as are examples of where each principle has been discussed in a legal context.

---

The pinnacle of these efforts may have been Robert Mnookin’s work with the other SCCN members that gave rise to provocative chapters in *BARRIERS TO CONFLICT RESOLUTION* (Kenneth J. Arrow et al. eds., 1995), his speech at the *Ohio State Journal on Dispute Resolution* Symposium, reflected in *Why Negotiations Fail: An Exploration of Barriers to the Resolution of Conflict*, 8 OHIO ST. J. ON DISP. RESOL. 235, 242–43 (1993), and similar work from that period.

The support of SCCN gave rise to writings from a many current professors who teach negotiation and whose scholarship is rooted in the works of SCCN principal investigators. These professors include Craig Fox (UCLA business), Chris Guthrie (Vanderbilt law), Russell Korobkin (one of the most prolific in the area of psychology of legal decision, now at UCLA law), Jeffrey Rachlinski (Cornell law) and others (I count myself in or near this cohort). In addition, collaborations between SCCN members and law professors not traditionally associated with dispute resolution or psychology occurred on occasion. I am thinking in particular of work produced by Amos Tversky collaborating with Stanford Law professor Mark Kelman.

Now the work of great cognitive and behavioral psychologists is so widespread that it is difficult to imagine that in the 1980’s, prior to the formation of the SCCN, there was virtually nothing in the legal literature on dispute resolution and psychology. For example, a December 10, 2009 Westlaw search in the “JLR” (Journals and Law Reviews) database for “Tversky” yields 1,934 documents.

<sup>47</sup> The list that follows is an extension of a project started in the mid-1990s and continues today. The first list of principles I published may be found in Richard Birke & Craig R. Fox, *Psychological Principles in Negotiating Civil Settlements*, 4 HARV. NEGOT. L. REV. 1, 1–2 (1999), and in Richard Birke, *Settlement Psychology: When Decision Making Processes Fail*, 18 ALTERNATIVES TO HIGH COST LITIGATION 212, 212–18 (2000).



## SCIENTIFIC INNOVATIONS AND PRACTICAL APPLICATIONS

### 1. *Psychological Principles Associated with Evaluation*

- Naive Realism and Biased Assimilation: People believe that they "see the world as it is," and this causes them to overweight information that confirms pre-existing hypotheses, and underweigh disconfirming information.<sup>48</sup>
- Confirmation Bias: People look for information that buttresses preexisting hypotheses in places likely to produce it.<sup>49</sup>
- Certainty and Possibility (Psychophysics of Chance): Decisionmakers value the changes from impossibility to possibility, or from high likelihood to certainty, far more than equivalent changes in probability elsewhere on the certainty continuum.<sup>50</sup>
- False Uncertainty (Psychophysics of Chance): People hesitate to make decisions when awaiting the outcome of a preliminary event, even where that preliminary event is irrelevant to the decision.<sup>51</sup>
- Focal Points: People are drawn to insignificant deal points if those points can be made sufficiently salient or focal.<sup>52</sup>
- Availability: People fail to differentiate adequately their case from notorious cases.<sup>53</sup>
- Anchoring: People get stuck on salient, irrelevant numbers.<sup>54</sup>

---

<sup>48</sup> See Charles G. Lord et al., *Biased Assimilation and Attitude Polarization: The Effects of Prior Theories on Subsequently Considered Evidence*, 37 J. PERSONALITY AND SOC. PSYCHOL. 2098 (1979); Birke & Fox, *supra* note 47, at 29.

<sup>49</sup> Lord, *supra* note 48.

<sup>50</sup> See Kahneman & Tversky, *supra* note 5; Amos Tversky & Craig R. Fox, *Weighing Risk and Uncertainty*, 102 PSYCHOL. REV. 269 (1995); Amos Tversky & Daniel Kahneman, *Advances in Prospect Theory: Cumulative Representations of Uncertainty*, 5 J. RISK & UNCERTAINTY 297 (1992).

<sup>51</sup> Birke & Fox, *supra* note 47, at 22–23.

<sup>52</sup> THOMAS SCHELLING, *THE STRATEGY OF CONFLICT* (Harvard Univ. Press 1981) (1960).

<sup>53</sup> Birke & Fox, *supra* note 47, at 8; Amos Tversky & Daniel Kahneman, *Availability: A Heuristic for Judging Frequency and Probability*, 5 COGNITIVE PSYCHOL. 207, 208 (1973).

<sup>54</sup> Birke & Fox, *supra* note 47; Tversky & Kahneman, *supra* note 26, at 3, 14–18.

- Base Rate Neglect: People over-rely on misleading pieces of information that happen to be particularly salient, and they undervalue objective, collected data about similar cases.<sup>55</sup>
- Ellsberg's Paradox: People prefer known risks to unknown risks, even when that preference yields worse results.<sup>56</sup>
- Temporal Nature of Preferences: Future forecasts of preferences are poorly aligned with present desires.<sup>57</sup>
- Illusion of Control: People believe that their contribution to an activity is valuable even when it is not.<sup>58</sup>
- Positive Illusions: People believe that their contribution is more valuable than it actually is.<sup>59</sup>
- Optimistic Overconfidence: People assess uncertainty levels optimistically.<sup>60</sup>
- False Consensus Bias (Projection): People believe that others think the way they do or have values similar to their own.<sup>61</sup>

≈

---

<sup>55</sup> Daniel Kahneman & Amos Tversky, *On the Psychology of Prediction*, 80 PSYCHOL. REV. 237 (1973).

<sup>56</sup> Daniel Ellsberg, *Risk, Ambiguity, and the Savage Axioms*, 75 Q.J. ECON. 643 (1961).

<sup>57</sup> DANIEL GILBERT, STUMBLING ON HAPPINESS (2006).

<sup>58</sup> See Ellen J. Langer & Jane Roth, *Heads I Win, Tails It's Chance: The Illusion of Control as a Function of the Sequence of Outcomes in a Purely Chance Task*, 32 J. PERSONALITY & SOC. PSYCHOL. 951, 951-53 (1975).

<sup>59</sup> SHELLY E. TAYLOR, POSITIVE ILLUSIONS: CREATIVE SELF-DECEPTION AND THE HEALTHY MIND 32-34 (1989); Birke & Fox, *supra* note 47, at 14.

<sup>60</sup> David A. Armour & Shelley E. Taylor, *When Predictions Fail: The Dilemma of Unrealistic Optimism*, in HEURISTICS AND BIASES: THE PSYCHOLOGY OF INTUITIVE JUDGMENT 334 (Thomas Gilovich et al. eds., 2002); Daniel Kahneman & Amos Tversky, *Conflict Resolution: A Cognitive Perspective*, in BARRIERS TO CONFLICT RESOLUTION 44-46 (Kenneth Arrow et al. eds., 1995).

<sup>61</sup> Lee Ross et al., *The "False Consensus Effect": An Egocentric Bias in Social Perception and Attribution Processes*, 13 J. EXPERIMENTAL SOC. PSYCHOL. 279 (1977).

## SCIENTIFIC INNOVATIONS AND PRACTICAL APPLICATIONS

- The Endowment Effect: A thing possessed becomes more valuable to the holder than to the market.<sup>62</sup>
- Fixed Pie Bias: People tend to view situations as “zero-sum.”<sup>63</sup>
- Irrational Escalation: Sunk costs compel continued funding of losing struggles.<sup>64</sup>
- Mental Accounting: Arbitrary mental divisions of fungible assets into categories constrain the frontier of available utility.<sup>65</sup>
- Perspective Bias: People evaluate information in accordance with partisan roles.<sup>66</sup>

### 2. Psychological Principles Associated with Persuasion

- Reactive Devaluation: (a) Things that are offered are less valuable than things that are not offered; (b) Offers from an opponent are evaluated according to the status of the offeree relative to the offeror.<sup>67</sup>

---

<sup>62</sup> Daniel Kahneman et al., *Experimental Tests of the Endowment Effect and the Coase Theorem*, 98 J. POL. ECON. 1325, 1326 (1990); Jeffrey Evans Stake, *The Uneasy Case for Adverse Possession*, 89 GEO. L.J. 2419, 2471 (2001).

<sup>63</sup> Max H. Bazerman & Margaret A. Neale, *Heuristics in Negotiation: Limitations to Effective Dispute Resolution*, in NEGOTIATING IN ORGANIZATIONS 51, 62–63 (1983); Birke & Fox, *supra* note 47, at 30.

<sup>64</sup> See, e.g., Birke & Fox, *supra* note 47, at 23; Martin Shubik, *The Dollar Auction Game: A Paradox in Noncooperative Behavior and Escalation*, 15 J. CONFLICT RESOL. 109, 109–11 (1971).

<sup>65</sup> Gerald L. Clore, *For Love or Money: Some Emotional Foundations of Rationality*, 80 CHI.-KENT L. REV. 1151, 1159 (2005); Richard H. Thaler, *Mental Accounting Matters*, 12 J. BEHAV. DECISION MAKING 183 (1999).

<sup>66</sup> Linda Babcock et al., *Biased Judgments of Fairness in Bargaining*, 85 AM. ECON. REV. 1337 (1995); Birke & Fox, *supra* note 47, at 14; Lyle A. Brenner et al., *On the Evaluation of One-Sided Evidence*, 9 J. BEHAV. DECISION MAKING 59 (1996); George Loewenstein et al., *Self-Serving Assessments of Fairness and Pretrial Bargaining*, 22 J. LEGAL STUD. 135 (1993); Leigh Thompson & George Loewenstein, *Egocentric Interpretations of Fairness and Interpersonal Conflict*, 51 ORG. BEHAV. & HUM. DECISION PROC. 176 (1992).

<sup>67</sup> Birke & Fox, *supra* note 47, at 48; Lee Ross, *Reactive Devaluation in Negotiation and Conflict Resolution*, in BARRIERS TO CONFLICT RESOLUTION 27, 29 (Kenneth J. Arrow et al. eds., 1995).

- Fundamental Attribution Error: We react to situations while others act in accordance with immutable character traits.<sup>68</sup>
- Reciprocation of Concessions: People feel obliged to reciprocate for acts of goodwill, even if the act produces no value and was not requested or wanted.<sup>69</sup>
- Rejection of Offers and Later Cognitive Dissonance (Commitment Bias): It is harder to say "yes" if you have already said "no."<sup>70</sup>
- Authority: Perceived authority causes changes in decisionmaking leading to compliance.<sup>71</sup>
- Scarcity or Deadlines: Fleeting offers or disappearing commodities seem more valuable than if they were plentiful or available on request.<sup>72</sup>
- Fairness as a Decisionmaking Criterion: People reject deals that leave them better off than no deal if they perceive that their norms of fairness are being violated in accepting the deal.<sup>73</sup>
- Construal Biases: People think that others hold more extreme views than they do, and are unwilling to accept that others are generally moderates in a partisan situation.<sup>74</sup>

---

<sup>68</sup> SUSAN T. FISKE & SHELLEY E. TAYLOR, SOCIAL COGNITION 67–86 (2d ed. 1991); Lee Ross, *The Intuitive Psychologist and His Shortcomings: Distortions in the Attribution Process*, 10 ADVANCES IN EXPERIMENTAL SOC. PSYCH. 173, 183 (Leonard Berkowitz ed., 1977); Jonathan Todres, *Law, Otherness and Human Trafficking*, 49 SANTA CLARA L. REV. 605, 610 (2009).

<sup>69</sup> ROBERT B. CIALDINI, INFLUENCE: SCIENCE AND PRACTICE 17–56 (4th ed. 2001); Birke & Fox, *supra* note 47, at 51.

<sup>70</sup> CIALDINI, *supra* note 69, at 67–75; Birke & Fox, *supra* note 47, at 52.

<sup>71</sup> STANLEY MILGRAM, OBEDIENCE TO AUTHORITY (1983); PHILIP G. ZIMBARDO ET AL., THE PSYCHOLOGY OF ATTITUDE CHANGE AND SOCIAL INFLUENCE (1991); Birke & Fox, *supra* note 47, at 55.

<sup>72</sup> CIALDINI, *supra* note 16, at ch. 7; Birke & Fox, *supra* note 47, at 56.

<sup>73</sup> Werner Güth et al., *An Experimental Analysis of Ultimatum Bargaining*, 3 J. ECON. BEHAV. & ORG. 367 (1982); Birke & Fox, *supra* note 47, at 34–35.

<sup>74</sup> Robert H. Mnookin & Lee Ross, *Introduction*, in BARRIERS TO CONFLICT RESOLUTION 3, 10–19 (Kenneth J. Arrow et al. eds., 1995).

## SCIENTIFIC INNOVATIONS AND PRACTICAL APPLICATIONS

- Inertia of Preferences: People will fail to take simple steps to further their interests if there is a preexisting decision methodology that offers a second best alternative.<sup>75</sup>
- Liking: People really do say “yes” more to people they like.<sup>76</sup>
- Social Proof: If everyone is doing it, it must be okay.<sup>77</sup>
- Risk Aversion: People are risk avoiding in the face of gains.<sup>78</sup>
- Loss Aversion: People are risk seeking in the face of losses.<sup>79</sup>
- Framing/Prospect Theory: Many equivalent deals are accepted or rejected depending on the framing of the offer as opposed to the value of the offer.<sup>80</sup>
- Concession Aversion (status quo bias): People do not value equal trades from a neutral perspective. They distort the value of the offer so as to overvalue the loss, making equal trades difficult to effectuate.<sup>81</sup>

For the practicing negotiator or mediator, cognitive and behavioral psychology suffer from their own success. Psychological principles are typically individually documented—indeed, it is critical to the success of an experiment that a single principle be isolated, lest the experiment yield ambiguous hypotheses about the result. As a result, relatively little is known about which principles will trump other principles when a negotiation situation triggers more than one psychological principle—a much more typical result than a situation in which only one psychological principle is

---

<sup>75</sup> Russell Korobkin, *Inertia and Preference in Contract Negotiation: The Psychological Power of Default Rules and Form Terms*, 51 VAND. L. REV. 1583 (1998).

<sup>76</sup> CIALDINI, *supra* note 69; Birke & Fox, *supra* note 47, at 54.

<sup>77</sup> Birke & Fox, *supra* note 47, at 54.

<sup>78</sup> Daniel Bernoulli, *Exposition of a New Theory on the Measurement of Risk*, 22 ECONOMETRICA 23 (Louise Sommer trans., 1954) (1738); Birke & Fox, *supra* note 47, at 43.

<sup>79</sup> Birke & Fox, *supra* note 47, at 43.

<sup>80</sup> Birke & Fox, *supra* note 47, at 44; Kahneman et al., *Prospect Theory: An Analysis of Decision Under Risk*, 47 ECONOMETRICA 263 (1979).

<sup>81</sup> Russell Korobkin, *The Status Quo Bias and Contract Default Rules*, 83 CORNELL L. REV. 608 (1998).

activated. For example, in an offer to settle a lawsuit, will the availability heuristic inform our estimate of the true value of settlement, or will that amount be the product of loss aversion? As lawyers engage in the rich subjects of evaluation of a claim and persuasion of others, the body of psychological literature yields contradictory advice about such matters as whether to make the first offer (anchoring), or to wait (create a focal point by splitting the difference).

Psychologists have done more than merely poke holes in the economic model by demonstrating the obvious shortcomings of too strictly rational a model. They have done substantial work mapping out a “limited rationality” decisionmaking landscape. However, the mapping effort is incomplete and individual principles are rarely encountered in isolation. The absence of knowledge about hierarchy and interplay among psychological factors limits a negotiator or mediator’s ability to apply psychological explanations to all decisionmaking behavior.

Could it be that neuroscience could provide answers where economics, self-study, and psychology cannot?

### III. THE SCIENCE OF NEUROSCIENCE

In order to understand how new neuroscience may impact decision theory, it is necessary to have at least a rudimentary understanding of the study of the brain. In this section, I will offer the lightest treatment I can of the relevant subject matter, and refer to thorough but approachable texts for deeper understanding.

#### *A. A Brief View of the Early Days of Brain Study—Injuries and Animals*

Much of the early study of the brain was based in what is now recognized as nonsense. Phrenology and the reading of bumps were preceded by barbaric surgeries performed on the mentally ill and on belief that the “humours” inhabited the brain. But along the way, someone had an accident that destroyed part of his brain, and doctors made note of behavioral changes. In this way, particular regions of the brain became correlated with particular behaviors and deficits.

Perhaps the most famous of these poor souls is Phineas Gage, who, while working on a railroad, had an iron bar rammed by an explosion through the bottom of his jaw, through his brain, and out the top of his skull. Gage survived, but according to friends, he was a different person. Formerly reserved, he swore in public and behaved in socially inappropriate ways. He

## SCIENTIFIC INNOVATIONS AND PRACTICAL APPLICATIONS

is now known to have damaged medial and orbital regions of his prefrontal cortex.<sup>82</sup> As a result of the prevalence of injuries like Gage's, a rather sophisticated form of brain mapping has occurred.<sup>83</sup>

Animal study has also helped scientists understand the brain, but various prohibitions and inhibitions have rendered the scientific record less rich than might have been expected. Early scientists were not persuaded that human brains and animal brains shared sufficient characteristics to make study worthwhile, and in various periods, experimentation on animals was considered immoral and distasteful.<sup>84</sup>

### B. *Today's Alphabet Soup—PET, TMS, EEG and fMRI*<sup>85</sup>

Some of the first modern neuroimaging studies occurred through *positron emission tomography* (PET), in which a radioactive tracer is injected into the subjects. Researchers can then isolate those parts of the brain associated with various activities, like moving a hand or recognizing a face. However, PET scans are slow and expensive, and thus their application has been limited.<sup>86</sup>

Electroencephologram (EEG) and magnetoencephologram (MEG) technologies measure electrical impulses in the brain. Typically, a substantial piece of rubberized headgear studded thoroughly with electrodes is applied to

---

<sup>82</sup> The Phineas Gage story is one of the most common stories encountered in this field. This version was inspired by the retelling by Michael S. Gazzaniga and Megan S. Steven, in *Free Will in the 21<sup>st</sup> Century*, in *NEUROSCIENCE AND THE LAW* (Brent Garland ed., 2004).

<sup>83</sup> Such injuries are categorized under the catch-all name "lesions," which seems to be a rather mild sounding word when applied to accident-induced lobotomies and the like. *Id.*; SCOTT A. HUETTEL ET AL., *FUNCTIONAL MAGNETIC RESONANCE IMAGING* 452 (2d ed. 2009) ("To this end, several groups around the world have established large databases, or registries, of individuals who have brain lesions and who have been studied while performing large numbers of different tasks.").

<sup>84</sup> IACABONI, *supra* note 3. For a more thorough discussion of the early pioneers in brain science, see STANLEY FINGER, *ORIGINS OF NEUROSCIENCE: A HISTORY OF EXPLORATIONS INTO BRAIN FUNCTION* (2001); *see also* STANLEY FINGER, *MINDS BEHIND THE BRAIN: A HISTORY OF THE PIONEERS AND THEIR DISCOVERIES* (2000). For an example of monkeys being subjected to the same "lesion" that Phineas Gage suffered, see DREW WESTEN, *supra* note 3, at 57.

<sup>85</sup> For a terrific quick look at fMRI in use, *see* <http://www.mayoclinic.com/health/mri/MM00395>. For information on EEG machines, *see* <http://www.eeginfo.com/what-is-neurofeedback.htm>. For a video demonstration of a PET scan, *see* <http://videos.howstuffworks.com/multi-media-productions/1185-pet-scan-imaging-advances-video.htm>.

<sup>86</sup> HUETTEL, *supra* note 83, at 4.

a subject whose head has been prepared with a coating of conductive gel solution. The subject is then exposed to stimuli and his reactions, and perhaps decisions, are recorded in perfect time synchrony with electrical signals emitted from various areas of the brain. EEG and MEG measure what are called Event Related Potentials, or ERPs, and are related to either cognitive or sensory processing.<sup>87</sup>

Transcranial Magnetic Stimulation (TMS) disables part of the brain with a powerful and focused magnetic pulse applied by holding an electromagnetic “paddle” somewhat smaller than a table tennis racket near the skull of the subject. This pulse can be a single brief pulse or a series of tiny pulses over several minutes, called rTMS.<sup>88</sup> TMS makes it is possible to study in a noninvasive manner the behavioral deficits created by the disability. This device allows scientists to replicate injury for purposes of crafting treatments, and it allows some intelligent speculation about the primary function of the disabled area. Exploration of Broca’s area and Wernecke’s region are prime examples of the usefulness of TMS.<sup>89</sup>

Perhaps the uncontested champion of brain research is the functional magnetic resonance imager, or fMRI. The fMRI measures changes in the oxygen levels in more active parts of the brain by inducing a series of magnetic pulses tuned to the frequency of hydrogen nuclei. The energy absorbed and emitted by the nuclei may be measured and recorded.<sup>90</sup> Thus, if stimulation in the form of a question, picture, or situation activates part of the brain, and that part of the brain draws more oxygen than when idle, the fMRI can measure which parts of the brain become active under which conditions. The full potential of this ability has barely begun to be mined. “In barely 15 years, fMRI has grown from a theoretical concept to become the dominant technique in cognitive neuroscience.”<sup>91</sup>

All of the technologies yield great insights, but are limited. None takes a picture of an emotion. They capture electrical impulses, magnetic responses, and the like. While miraculous, these machines and techniques yield data that requires a great deal of extrapolation. However, despite these limitations, there are now enough studies to begin in earnest the process of applying the most relevant data to the settlement of legal disputes.

---

<sup>87</sup> *Id.* at 314.

<sup>88</sup> *Id.* at 450–52.

<sup>89</sup> For an instructive and short video in which Broca’s area is temporarily impaired in a subject, see <http://technorati.com/videos/youtube.com%2Fwatch%3Fv%3D67HMx-TdAZI>.

<sup>90</sup> HUETTEL, *supra* note 83, at 3.

<sup>91</sup> *Id.*



## SCIENTIFIC INNOVATIONS AND PRACTICAL APPLICATIONS

### IV. NEUROSCIENTIFIC STUDIES APPLIED TO AN OFF-THE-RACK MEDIATION

In an effort to illustrate the potential importance of the fMRI and other brain science to the process of negotiating or mediating a settlement, I will now describe ways in which some recent findings in neuroscience might apply to some situations common in a generic mediation process.<sup>92</sup> In this template, parties first gather for a joint session in which the mediator makes an opening statement and the parties, directly or through their lawyer, are then encouraged to relate their side of the story to the mediator. The mediator then seeks to eliminate misunderstandings, often by shuttling back and forth between rooms. The mediator encourages the parties to stop looking backward and become future-oriented. The mediator encourages the parties to think about options, make and react to offers, and consider how various offers compare to their litigation alternative. If the parties are stuck or at impasse, the mediator may look for creative ways to attempt to bridge any remaining gap. In some instances, if the parties are unable to bridge the gap, the mediator might make a proposal for the parties to consider.<sup>93</sup>

This deceptively simple process is filled with process questions for the mediator. At the beginning, should the parties be in the same room? After all, they are adversaries in a lawsuit, and there may be hard feelings between them. Perhaps the parties are thoroughly familiar with the other side's legal theory and factual beliefs. What good is it to keep the parties in the same

---

<sup>92</sup> Mediation is not necessarily a preferred mode of analysis to negotiation, but is amenable to a more standardized template. It should not take much imagination to translate the neuroscience from mediation to negotiation. While mediation varies considerably from practitioner to practitioner and from dispute to dispute, I use a template that is widespread, if not universally endorsed.

<sup>93</sup> With the exception of the mediator's offer (which is sometimes left out), the stages described above have been overtly discussed in every class or training I have offered, attended, read about, or discussed with a colleague. I suggest that the process I have described is the current "standard form mediation." For academic descriptions, see STEPHEN B. GOLDBERG ET AL., *DISPUTE RESOLUTION* (2002); *see also* Arbitration & Mediation, [http://www.statelawyers.com/Practice/Practice\\_Detail.cfm/PracticeTypeID](http://www.statelawyers.com/Practice/Practice_Detail.cfm/PracticeTypeID) (last visited Nov. 25, 2009); Jessica A. Stepp, *How Does The Mediation Process Work?*, *MEDIATE.COM*, Feb. 2003, <http://www.mediate.com/articles/steppJ.cfm>; Census Mediation Program, [http://www.census.gov/adr/mediation\\_process.html](http://www.census.gov/adr/mediation_process.html) (last visited Nov. 25, 2009); Understanding the Child Custody Mediation Process—Lawyers.com, <http://family-law.lawyers.com/child-custody/Understanding-the-Child-Custody-Mediation-Process.html> (last visited Nov. 25, 2009); Accident Claims Law—Mediation, <http://www.accidentclaimslaw.com/html/mediation.html> (last visited Nov. 25, 2009).

room for yet another recitation of the facts and law? Perhaps this is why many mediations quickly break into caucus.

Should the parties be encouraged to tell their stories? Mediators assume there is a cathartic effect when a party has the opportunity to tell their side of the story without interruption or objection. The parties can say whatever they want, without regard to relevance or materiality. They can bring their emotions into play. Conventional wisdom suggests that once the parties have “blown off a little steam,” they are clearer minded and can approach settlement in a calmer light. Is this accurate? Is it productive to invite parties first to vent, then to bargain?

Similar questions pervade the mediation process to the end. When a mediation is about to break down, should a mediator suggest a settlement? Should she advocate for her settlement, or if the parties resist, should the mediator play a more passive role?

The remainder of this section of this article consists of a set of phases in a typical mediation, arranged in chronological order. Neuroscientific studies relevant to the activities associated with each phase are first described and then used as the basis for extrapolations from scientific research to mediation techniques.

#### *A. Phase One—The Opening Statement: Mirror Neurons & Universal Facial Expression*

In the first phase of mediation, the mediator typically introduces himself, goes over the ground rules for the mediation, and discusses the plan for the mediation. Lawyers and parties may or may not make opening statements.

While some mediators support the idea of long joint sessions, and some advocate for a no-caucus model, these mediators appear to be in the minority, as most active mediators prefer the simplicity, comfort, and confidentiality of a short opening and a quick move to caucus.<sup>94</sup> In fact, a sizable number of mediators hold only cursory opening statements in which the parties do not speak and the lawyers speak minimally if at all. This may be a terrible tactical choice.

---

<sup>94</sup> See, e.g., Christopher W. Moore, *The Caucus: Private Meetings That Promote Settlement*, 16 *MEDIATION Q.* 87, 88–90 (1987). When I entered the phrase “no-caucus” in the same sentence as “mediation” in a Westlaw search, it returned three results. When I entered “caucus” in the same sentence as “mediation,” it returned 654. I have not read them all, but a cursory review shows that they tend to be about how to caucus effectively and why one ought to use caucuses, with only scant reference to the idea of not caucusing.

## SCIENTIFIC INNOVATIONS AND PRACTICAL APPLICATIONS

In his book *Mirroring People*, Dr. Marco Iacoboni describes the discovery and understanding of a “mirror neuron.”<sup>95</sup> These neurons were discovered in macaque monkeys in a lab in Italy in the 1990s.<sup>96</sup> Researchers who were studying an area of the brain known as F-5 knew it was related to hand movement. They were interested in learning how human patients with various disorders might be coached to have more manual dexterity.

Scientists noticed that the monitors on the F-5 section of the monkeys’ brains were activated even when the monkeys were not moving. They figured out that the brain activity of the monkeys corresponded to movements the monkeys observed the scientists performing. The monkeys were mirroring in their brains what they saw another primate doing.<sup>97</sup>

Brain scans of the monkeys revealed that the monkey’s neurons act in a virtually identical manner whether the monkey is eating a banana or observing another monkey eat a banana. The monkey’s brain experiences the act of eating even though it is not.<sup>98</sup>

Iacoboni spends much of his book persuading the reader that humans, not just monkeys, are hard-wired for empathy.<sup>99</sup> He notes similarities between the gyri and sulci (bumps and grooves) of the macaque brain and the human brain, and offers illustrations of the likely correlations between the macaque brains and ours.<sup>100</sup> He concludes that humans use mirror neurons for empathy, language, and self-awareness.<sup>101</sup>

If we have mirror neurons, does that mean we can use empathic ability to read others accurately? This would depend on a finding that humans speak in a universal emotional language. It appears that they do.

As a young scientist in the 1950’s, Paul Ekman traveled the world photographing faces of people from various cultures and showing those photographs to members of other cultures.<sup>102</sup> Ekman made a point of traveling to cultures that were as primitive and unexposed to Western culture

---

<sup>95</sup> IACABONI, *supra* note 3, at 4.

<sup>96</sup> The lab was operated by Dr. Giacomo Rizzolatti. *Id.* at 8.

<sup>97</sup> *Id.* at 10.

<sup>98</sup> *Id.* at 14–15.

<sup>99</sup> Building on and paralleling the research on monkeys, brain imaging and magnetic stimulation data on humans have revealed a mirror neuron system that fulfills the same functions as it does in monkeys. . . . Human mirror neuron areas seem important for empathy, self-awareness and language.

*Id.* at 260.

<sup>100</sup> IACABONI, *supra* note 3, at 62.

<sup>101</sup> *Id.* at 281.

<sup>102</sup> PAUL EKMAN, *EMOTIONS REVEALED: RECOGNIZING FACES AND FEELINGS TO IMPROVE COMMUNICATION AND EMOTIONAL LIFE 1* (2003).

as possible.<sup>103</sup> Through his research, he discovered that facial expressions were universal.<sup>104</sup>

A native of Papua New Guinea shown a picture of a Caucasian San Franciscan woman could readily identify the expression of disgust, anger, or fear in her face. The ability to distinguish even small expressions was surprisingly unconnected with culture. Nature, not nurture, controlled in this instance.

Ekman concluded that the universality of facial expression had evolutionary advantages. The ability to communicate without words certainly must have been an advantage among creatures with a limited or non-existent spoken language. Moreover, given that members of different tribal communities who did not have a common language had a need to interact—at least to determine who was friend and who was foe—those who could more credibly express their peaceable intent and those who could more accurately gauge the intent of others were more likely to reproduce than those with lesser skills.<sup>105</sup>

Ekman further found that babies born blind make the same facial expressions as the sighted do. This remarkable discovery cemented the idea that facial expressions are innate.

Ekman more recently has asserted that certain facial muscles are only accessible if a certain pattern of brain activity accompanies the movement—that is, there are “tell tale” expressions that can only be made when the associated feeling is genuine. For example, while one can “scrunch” the forehead’s central muscle to mimic concern, even when not feeling particularly concerned, most people lack the ability to move their eyebrows into a certain position unless they are truly sad.<sup>106</sup>

Ekman’s theories are not strictly for the laboratory. They are making their way into everything from trial analysis to airport security. In his book, *Telling Lies*, Ekman describes his techniques as adapted over to the activity of lie detection. Videos available on the internet show Ekman discussing his

---

<sup>103</sup> *Id.*

<sup>104</sup> Actually, Ekman gives the credit for the discovery to Darwin. Ekman may properly be said to have proved universality to the satisfaction of the scientific community, where Darwin’s speculation was just that. *Id.* at 2, 14.

<sup>105</sup> For an interesting discussion of how people sometimes identify with each other and sometimes against each other, see DAVID BERREBY, *US AND THEM: UNDERSTANDING YOUR TRIBAL MIND* (2005). The book is, like so many cited in this article, full of insights derived from neuroscience.

<sup>106</sup> This muscle is referred to by Darwin as the “grief muscle.” EKMAN, *supra* note 102, at 100. Apparently, Woody Allen and Jim Carrey are exceptions to this rule. *Id.* at 103.

## SCIENTIFIC INNOVATIONS AND PRACTICAL APPLICATIONS

work and dissecting the testimony of Kato Kaelin in the widely broadcast case *People v OJ Simpson*.<sup>107</sup> Ekman's lie detection techniques are now used by the Transportation Safety Authority to help detect suspicious activity.<sup>108</sup>

Taken together, the ideas of universal expression and mirror neurons suggest that humans have been bred by our environment to a species-constant learning and that humans have physical characteristics that include mirror neurons and particular muscles that lead to particular communicative expressions that are readily understood by other members of the species. This idea that humans can read others leads to a variety of hypotheses that might militate toward longer joint sessions in mediation, or more face-to-face contact with opposing negotiators.

Many a high-minded, honest negotiator has found out that it is very hard to persuade an opponent of one's own sincerity.<sup>109</sup> More face-to-face contact in dispute resolution might offer the opportunity to demonstrate sincerity in an emotionally convincing manner. It may also offer the opportunity to assess credibility of the opponent—client or lawyer.

President George W. Bush made famous his experience of looking into Vladimir Putin's eyes and getting a "sense of his soul."<sup>110</sup> While that statement may have been the subject of some later ridicule, the fact that he said it and people readily understood the activity (if they did not necessarily agree with the conclusion) demonstrates the broad understanding that people are entitled to rely on judgments about the intent of others merely by

---

<sup>107</sup> *People v. Simpson*, No. BA097211, 1995 WL 704381 (Cal. Super. Los Angeles County, Oct. 13, 1995). For a video of Ekman dissecting Kaelin's testimony, see <http://www.paulekman.com/about-ekman/>.

<sup>108</sup> See Thomas Mydans, *Security Arsenal Adds Behavior Detection: Controversial Technique Targets 'Suspicious' People*, USA TODAY, Sept. 26, 2007, at 1B ("[T]he Ekman Group, was paid \$1 million to train 1,200 TSA inspectors last month in his interviewing technique. He proposed a study to Homeland Security researchers to find behaviors indicating hostile intent among travelers walking around airports."); see also Clark Freshman, *After Basic Mindfulness Meditation: External Mindfulness, Emotional Truthfulness and Lie Detection in Dispute Resolution*, 2006 J. DISP. RESOL. 511. Professor Freshman at UC Hastings College of Law is one of the few people authorized to conduct training on lie detection on behalf of Professor Ekman. Michael Wheeler at Harvard Business School is the only other of which I am aware.

<sup>109</sup> EKMAN, *supra* note 102, at 25; see, e.g., Richard H. McAdams, *Group Norms, Gossip, and Blackmail*, 144 U. PA. L. REV. 2237, 2261 (1996) ("Sincerity does not ensure persuasiveness; group members will typically think criticism is mistaken. But the perception of insincerity nearly guarantees unpersuasiveness, so a critical signal that other members believe to be sincere is more likely to persuade them.").

<sup>110</sup> Caroline Wyatt, *Bush and Putin: Best of Friends*, BBC NEWS, June 16, 2001, <http://news.bbc.co.uk/2/hi/europe/1392791.stm>.

observing their faces. Parents tell children to “look me in the eye” when they suspect a child is lying, and they trust their ability to discern a fear of consequences of the underlying act (e.g., punishment for breaking the vase) from fear that their prevarication (it must have been the cat) will be discovered. As a parent, I engage in that method and I believe—perhaps mistakenly—that I can tell when my children are telling the truth and when they are not.<sup>111</sup>

Perhaps neuroscience suggests that mediators let the parties see each other more. They will be able to tell whether the other side is serious about settling the case or not. They will be able to tell whether they can trust information.<sup>112</sup>

If mirror neurons work and facial expressions give accurate clues to internal machinations, why avoid joint sessions? Perhaps the party who wants to mislead prefers the privacy of caucus, and perhaps the mediator with a good reputation provides a useful tool for an unscrupulous party, but these are not the reasons parties give for going to caucus. Parties cite confidential information and bad feelings as reasons to go into caucus, but mediations conducted in caucus often become exercises in mistrust. The lack of visual confirmation that words match affect causes listeners to distrust speakers’ intent.

Is it the case that all mediation should be conducted in joint session? Some say yes, but these are a rare few.<sup>113</sup> I am not trying to make their case here, but it is worth noting that neuroscience now offers some empirical

---

<sup>111</sup> For tips on negotiation with one’s offspring, see SCOTT DAVIS, *HOW TO NEGOTIATE WITH YOUR KIDS EVEN WHEN YOU THINK YOU SHOULDN’T: 7 ESSENTIAL SKILLS TO END CONFLICT AND BRING MORE JOY INTO YOUR FAMILY* (2003).

<sup>112</sup> In fact, in the training I have done for hundreds of insurance professionals on mediation, I have heard many times that they want to see the claimant speak in opening session. They are then able to increase the amount of their offer as a result of their opinion that the claimant would be a credible witness in front of a jury. These professionals will be evaluated many months later by a supervisor whose job is to do closed file reviews. These evaluators are looking for ways to encourage their staff to settle more economically, sometimes by paying less and other times by paying sooner or incurring fewer transaction costs. It is rare that an evaluator cannot find something to second guess, but the claims staff reports to me that they are never second guessed when they increase an offer based on a face-to-face meeting with the claimant. The adjusters trust their ability to discern the expected reaction of a juror and the evaluators trust their adjusters’ ability to do that, because they trust their own ability to do that.

<sup>113</sup> The leading proponents of a no-caucus model are Gary Friedman and Jack Himmelstein. See GARY FRIEDMAN & JACK HIMMELSTEIN, *CHALLENGING CONFLICT: MEDIATION THROUGH UNDERSTANDING* (2008).

insights that might tip the decision in favor of more time spent face-to-face than is the current norm.

*B. Phase Two—Telling the Tale: Fear Networks and the Executive Function of the Brain*

A litigator friend describes his cases as pancakes—some are thin but there are always two sides. Mediators and negotiators know it is important to hear both sides of the story, and in most legal disputes, there are more than two stories. The lawyers have interests and perspectives different than their clients, and clients may have mixed feelings and conflicting internal visions about the events that underlay the conflict.

It is sometimes the case that recapitulation of the events that gave rise to the lawsuit, or the rehearsal of the opponents' behavior during litigation can cause some emotional reaction on the part of the person telling their side of the story. Mediators commonly believe this process serves an important cathartic effect, and once the teller has released all his pent up feelings, he can start to bargain more rationally.<sup>114</sup> If he is bottled up, some of the emotional content will work its way into the process of making offers and concessions. Telling the tale will cause relaxation and with it will come a willingness to bargain.

So goes the conventional wisdom. Neuroscience may suggest otherwise. Neuroscientist Joseph LeDoux has studied fear responses for much of his career. His work extends the work on conditioned responses by famed behaviorist Ivan Pavlov.<sup>115</sup> LeDoux describes how Pavlov conditioned animals to expect pain by simultaneously providing a painful event with an inconsequential event. The inconsequential event then triggers fear. An

---

<sup>114</sup> See, e.g., NANCY L. ROGERS & RICHARD A. SALEM, A STUDENT'S GUIDE TO MEDIATION AND THE LAW 7–39 (1987) (“[In mediation,] parties are provided a forum where they can vent their feelings while telling their ‘stories’ so that they feel heard and understood.”); Jim Freund, *Three’s a Crowd—How to Solve a Knotty Multi-Party Dispute Through Mediation*, 64 BUS. LAW. 359, 368 (2009) (“Usually, at the outset of a two-party dispute mediation, I put everyone in a large room and let the parties and their counsel vent about the merits of their respective cases. I do this in part for psychological reasons: the parties have to feel the mediator has heard their strongest arguments . . .”); Barbara J. Gazeley, *Venus, Mars, and the Law: Mediation of Sexual Harassment Cases*, 33 WILLAMETTE L. REV. 605, 645 (1997) (“Each side needs to feel heard and understood and have their genuine emotions validated, regardless of how they have treated each other prior to the mediation. This cathartic experience often must occur before the parties can go of the dispute and work on a pragmatic resolution.”).

<sup>115</sup> JOSEPH E. LEDOUX, THE EMOTIONAL BRAIN: THE MYSTERIOUS UNDERPINNINGS OF EMOTIONAL LIFE 141–43 (1998).

example is the “Skinner Box,”<sup>116</sup> which typically has an electrified floor and either a bell or a light. In the experiment, a rat is placed in the box, and then the bell rings or the light comes on, and almost immediately, the floor is electrified, resulting in the rat receiving a painful shock. This protocol is repeated several times. Then the bell rings or the light comes on and the floor is not electrified. However, the rat reacts with the same fear response as if the floor had administered a shock. The floor is the direct stimulus and the bell or light is a conditioned stimulus, but the response is the same. From Pavlov and Skinner, we know the behavioral manifestations of conditioned fear. Now, neuroscience reveals the physical manifestations, and they are found in the telephone lines of the brain—neural pathways.

A particular neuron among the billions of neurons in the brain can fire—that is, release a chemical—to a number of nearby neurons. Neurons seem to have a choice of which nearby neurons they will “talk” to.<sup>117</sup> Once a chain reaction from one neuron to a distant other is complete, we have what is called a neural network. While there are billions of neurons in a brain, the number of possible neural networks is exponentially larger. There are more potential networks than a person could experience in a lifetime.<sup>118</sup>

Once a pair of neurons has fired in communication one to the other, they have subtly realigned, and for a time, subsequent realignment is easier. If pathways fire with enough duration or intensity, the neural network is said to be more durable. Pathways that fire with great frequency (e.g., the pathways between the eyes and hands) are quite durable and repeating patterns helps facilitate expertise in typing or playing piano. Pathways that are highly vivid are also readily reassembled, so a well-executed surprise birthday party may be readily recalled—feelings and emotions and smells and all—for many years after the event, and perhaps for life.

LeDoux found that the neurological pathways created by fear are among the most durable of all neural networks.<sup>119</sup> Fear, as one of the most successful evolutionary strategies,<sup>120</sup> is ingrained very deeply in the brain. Mice who have never encountered a cat have not learned to be afraid of cats; yet the first time they are placed in the presence of a cat, they show all the

---

<sup>116</sup> A good schematic and explanation of a Skinner Box may be found at <http://brembs.net/operant/skinnerbox.html>; see also LEDOUX, *supra* note 115, at 150.

<sup>117</sup> LEDOUX, *supra* note 115, at 139.

<sup>118</sup> Indeed, one of the measures of child development—the pruning of useless information from memory—is now thought to be the release of neurons from networks once thought to be of potential value.

<sup>119</sup> LEDOUX, *supra* note 115, at 145 (“Not only is fear conditioning quick, it is long very long lasting.”).

<sup>120</sup> *Id.* at 143, 147.



## SCIENTIFIC INNOVATIONS AND PRACTICAL APPLICATIONS

hallmark signals of fear—the freeze/fight/flight response pattern. There are also anecdotal reports of infants exhibiting a “startle response” to images of snakes and spiders, and there is little doubt about the existence of conditioned fear in humans.<sup>121</sup>

Once a conditioned fear response becomes associated with a natural fear—the sound of screeching brakes becomes associated with prior experiences of being struck by something, falling down, or otherwise sustaining traumatic physical injury—the conditioned response produces re-traumatization. The neural pathways associated with the fear response are readily re-engaged. Pavlov called this “spontaneous recovery.”<sup>122</sup>

In fact, once a fear pathway is created, it is unlikely to disappear or even diminish in its intensity. Perhaps this is why we may experience moments of childlike fear about something that we thought we long ago had resolved. A smell or an image might trigger a set of emotions in the “feeler” that seem disconnected from the environmental circumstances in which the feeler finds herself.

Fear changes over time, but through a process of extinction. Take the example of a rabbit that visits a watering hole. On one visit, a fox appears. From then on, the watering hole will trigger a “fear of the fox” response, even in the absence of the fox. The only way that the rabbit overcomes that fear is by experiencing enough post-scare visits to the watering hole without encountering the fox.<sup>123</sup> “Getting right back on the horse” is the best approach, not because it diminishes the fear, but rather because it creates a set of competing neural pathways that might trump the durable fear network.

LeDoux then turned to direct study of the brain through chemical tracers inserted near the origin of a particular fear stimulus. In this case, sound was the stimulus and the aural networks were implicated.<sup>124</sup> LeDoux found that fear traveled two paths—one directly to the body (the “low road”) and one that was mediated by the amygdala (the “high road”).<sup>125</sup> LeDoux found that the low road was faster—by the time the “mind” knew it was afraid, blood had already reached the legs. Therefore, it might seem that knowledge of fear is redundant. However, this is why the high road is important. It leads to the possibility of cognition about fear.<sup>126</sup>

---

<sup>121</sup> *Id.* at 146–47.

<sup>122</sup> *Id.* at 145 (footnote omitted).

<sup>123</sup> *Id.* at 145.

<sup>124</sup> LEDOUX, *supra* note 115, at 156 (showing the location of the tracers in the neuronal path).

<sup>125</sup> *Id.* at 164.

<sup>126</sup> *Id.* at 175.

Turning then to mediation, one must question whether it takes sense to ask the parties to recapitulate the story that leads to the hard feelings that lead to the lawsuit. There are certainly reasons to be cautious. In criminal law, there is much discussion about the revictimizing effect of putting a victim on the witness stand to be forced to recount the events underlying the criminal case.<sup>127</sup> There is every reason to believe that a person who retells in detail an event that is painful or traumatic fully relives that trauma in their neurons.

However, failure to adequately discuss the underlying emotional aspects of a lawsuit often results in the missed opportunity to discover the underlying interests of the parties. In a case that is driven by a mix of emotions and more tangible damages—for example, a retaliatory discharge claim—a plaintiff might ask for money to address lost wages but may also be asking for additional money that addresses her anger over the incident, or her fear that she may not be readily employable elsewhere. If these feelings of fear can be explored, it may be possible to address the fears in some way other than purely through financial compensation.<sup>128</sup> However, if the feelings are not allowed to surface, the only means of communication may be the exchange of money offers. Many mediations turn on a search for valuable non-monetary concessions that meet claimants' interests.

Moreover, strong anecdotal evidence suggests that parties in mediation take great satisfaction in telling their story, uninterrupted by objections or exhortations to “only discuss what is legally relevant.” Telling the tale may reignite neural fear networks, but settling a dispute without acknowledging the emotional “elephant in the room” may feel hollow or incomplete. On balance, perhaps the right thing to do is to get the party to tell the tale and relive the painful experience. But what next?

Research on an area of the brain known as the “executive” suggests that when executive functions are impaired, the brain tends to be more reactive

---

<sup>127</sup> See, e.g., William Wesley Patton, *Revictimizing Child Abuse Victims: An Empirical Rebuttal to the Open Juvenile Dependency Court Reform Movement*, 38 SUFFOLK U. L. REV. 303 (2005).

<sup>128</sup> For an example of this sentiment in a discussion about toxic torts, see D. Alan Rudlin and William P. Childress, *Case Management and Health Claims in Toxic Tort Litigation*, in ENVIRONMENTAL AND TOXIC TORT LITIGATION (2008) (“In preparation for settlement authority for the mediation, it is useful for each side to think of possible non-monetary options that may be available.”). For an example discussing an employment law setting, see Jean R. Sternlight, *Lawyers' Representation of Clients in Mediation: Using Economics and Psychology to Structure Advocacy in a Non-Adversarial Setting*, 14 OHIO ST. J. ON DISP. RESOL. 269, 342 (1999) (“Mediation offers parties an opportunity to voice their requests for nonmonetary relief that their attorneys may not have emphasized.”).

than active.<sup>129</sup> What are these executive functions? The current research about this area suggests that humans take in new data in what is now called “working memory,” formerly called “short term memory.” The average brain can hold about seven pieces of new data before there is a sharp drop-off in executive function—hence seven digit phone numbers, seven deadly sins, seven habits of highly successful people, etc.<sup>130</sup> The executive takes the data and compares it to stored data in the brain. We recognize a word based on past experience with that word. We duck when an object is flying toward our head because of some primal knowledge embedded in our genetic makeup.

However, when the executive compares the items in the in-tray to the items in storage, and the most ready comparison comes accompanied by an emotional tidal wave, the executive is overwhelmed and instinctive reactions dominate thoughtful reactions. In other words, the flooded executive is less able to consider new options for action. It will rely on freeze/fight/flight. This is not the best place for a party to be in a mediation. It would be better for the party to engage in a broader brainstorming session so that underlying interests could give rise to creative options.

What does this mean for the mediator? Perhaps it means that after a party tells a re-traumatizing tale, they need a substantial cool-down period before they are ready to bargain. The notion that a party should “get it all out” and then they are ready to bargain is accurate to a degree. They are ready to bargain after they get it all out, but not right away. I suggest that after a party experiences the trauma/catharsis of telling their story, it is a very good time for a coffee or lunch break, and it may even be the case in some disputes that it is a good place to end for the day.

If a break is not possible, one technique to consider when faced with a party who seems to be emotionally flooded is to call to that party’s attention to his own breathing. Mindful breathing is one of the most commonly

---

<sup>129</sup> For a useful and short definition, see Executive Function, *ENCYCLOPEDIA OF MENTAL DISORDERS*, <http://www.minddisorders.com/Del-Fi/Executive-function.html> (last visited Nov. 27, 2009).

The term executive function describes a set of cognitive abilities that control and regulate other abilities and behaviors. Executive functions are necessary for goal-directed behavior. They include the ability to initiate and stop actions, to monitor and change behavior as needed, and to plan future behavior when faced with novel tasks and situations. Executive functions allow us to anticipate outcomes and adapt to changing situations. The ability to form concepts and think abstractly are often considered components of executive function.

*Id.*

<sup>130</sup> See George A. Miller, *The Magical Number Seven, Plus or Minus Two: Some Limits on Our Capacity for Processing Information*, 63 *PSYCHOL. REV.* 81 (1956).

practiced meditation techniques in the world, and it exists in and outside of many religious, spiritual, and physical practices. Breathing is, by its nature, a present tense activity, and concentration on breathing helps the executive hear and respond to new information and offers less reactively.<sup>131</sup>

*C. Phase Three—Passing Information: Confirmation Bias & Reaction Devaluation in the fMRI*

It is well known and well proven that we do not hear information with neutral ears. One aspect of a phenomenon named “reactive devaluation” is that the recipient of an offer devalues offers from opponents and the recipient will treat the same offer more favorably when offered by a neutral.<sup>132</sup> This may be one reason mediation is effective after direct negotiations have broken down.

Another aspect of reactive devaluation is that we discount the value of things offered merely because they have been offered. This is clearly related to principles about scarcity—the less available something is, the more attractive it is—and the same item that we discount when offered is more attractive if held back or part of a menu of options.

Two additional principles exacerbate the bias created by reactive devaluation, namely confirmation bias and biases of assimilation. When we look for data and look at the data we find, we do so in biased ways. We sort data into two basic categories—supportive of our ideas or challenging to our ideas. In addition, we sort based on perspective, with a strong bias toward retaining and strengthening preexisting views.<sup>133</sup> If data support our belief, we think that data very important. If data contradict our belief, we think that the data are distinguishable and of lesser importance. If data are neutral, it is often because the data are mixed—a little good for us, a little good for them—and we find the parts that are good for us more persuasive than the parts that are good for them.<sup>134</sup>

We look for data in places that are unconsciously calculated to provide us the answers we seek. It has long been established that we unconsciously

---

<sup>131</sup> Paul Ekman endorses the practice as benefiting “emotional behavior awareness” and “impulse awareness.” EKMAN, *supra* note 102, at 238–39. Daniel J. Siegel devotes parts of at least six chapters of *Mindful Brain* to the topic, including a “how to.” DANIEL J. SIEGEL, *MINDFUL BRAIN: THE NEUROBIOLOGY OF WELL-BEING* (2008); *see also* James Shreeve, *Beyond the Brain*, NAT’L GEOGRAPHIC, Mar. 2005, available at <http://science.nationalgeographic.com/science/health-and-human-body/human-body/mind-brain.html>.

<sup>132</sup> Ross, *supra* note 67, at 29.

<sup>133</sup> *See supra* pp. 33–37.

<sup>134</sup> *See, e.g.,* Lord et al., *supra* note 48.

## SCIENTIFIC INNOVATIONS AND PRACTICAL APPLICATIONS

frame questions and seek information in ways and from places that create an evidence cache that is already sorted (or distorted) in our favor. This set of biases drives a great deal of the overconfidence in bargaining.

In his book, *The Political Brain*, Emory University psychology professor Drew Westen describes an fMRI study of political beliefs which appears to merely corroborate the principles described in the preceding few paragraphs. Westen and his colleagues, Dr. Stephan Hammann and Clint Kilts, gave members of each major political party dissonant information that was inconsistent with their preexisting beliefs. Specifically, Republicans looked at slides containing negative information about Republicans and positive information about Democrats. For Democrats, the test was the same, but the information that positive for Republicans and negative for Democrats.<sup>135</sup>

Westen expected to find that threatening information would activate neural networks associated with negative emotional states; that the information would activate parts of the brain associated with emotional regulation; that the brains studied would be “brains in conflict” between what they wanted to believed and what they ought to infer from evidence; and that subjects would “reason” with the parts of their brain most associated with “gut instinct” as opposed to those associated with true reasoning.<sup>136</sup>

It is not surprising that Westen found evidence consistent with reactive devaluation and confirmation bias. He found that when subjects heard consonant information, they had a mild reaction—no emotional flare-ups and no long enduring feelings. When subjects heard dissonant information, the brain scans showed evidence of hotter, more durable responses.<sup>137</sup> “When confronted with potentially troubling political information, a network of neurons becomes active that produces distress.”<sup>138</sup>

However, while reactive devaluation and confirmation bias were well understood prior to the fMRI, what was not known is what the brain does when these preferences and bias are manifesting themselves. We like to find information that lets us feel reassured that we are in control, and we are distressed to find out that maybe we are not—but why?<sup>139</sup>

Westen argues that dissonant information activates the animal side of a person, while consonant information activates the civilized exterior person.

---

<sup>135</sup> WESTEN, *supra* note 3, at xii-xiii. For Republicans, the information was a “flip flop” by President George W. Bush about VA Hospitals and support for veterans’ care. *Id.* For Democrats, the message was about a “flip-flop” by Senator/Presidential Candidate John Kerry about support for the invasion of Kuwait in the first Gulf War. *Id.*

<sup>136</sup> *Id.* at xi.

<sup>137</sup> *Id.* at 52–53.

<sup>138</sup> *Id.* at xiii.

<sup>139</sup> *See supra* pp. 497–99.

In an effort to make the two selves align, the brain manages to “shut down distress through faulty reasoning.” Moreover, the “neural circuits charged with the regulation of emotional states” shut down distress quickly and easily by recruiting “beliefs that eliminated the distress and conflict partisans had seemed to experience when they confronted unpleasant realities.”<sup>140</sup>

Westen was surprised to find that the brain was not “satisfied in just feeling better. It worked overtime to feel good, activating reward circuits that give partisans a jolt of positive reinforcement for their biased reasoning.” These circuits overlap with those of drug addicts who get their “fix.”

Westen discusses theories of evolutionary biology, concluding that humans are capable of a form of rational thought that exists primarily in the most recently evolved parts of the brain, namely the outer cortices, and that emotional thought occurs in parts of the brain that are older and which evolved in response to environmental conditions that are no longer as relevant to our survival. In simple terms, our “gut” is older than our “brain,” if by gut one refers to the emotional brain and by “brain” one refers to the cortices. Westen spends much of the remainder of his book showing how humans are more likely to be guided by impulses from the older emotional centers than from the newer, and only persistent efforts at activating and engaging the cortices have any hope at overriding the older, more dominant mental hardware.

Associated research described by Dr. David Linden in his book, *The Accidental Mind*, corroborates Westen’s thinking. Linden describes how the brain weaves coherent, seamless visual pictures from a series of individual images (known as saccades) in much the same way that a moving picture is really a series of stills.<sup>141</sup> People do not really see smooth images, but only think they do.<sup>142</sup> Linden notes that the “creation of coherent narratives in the brain is not limited to manipulation of low-level perception as occurs with visual saccades, but extends to higher perceptual and cognitive levels.”<sup>143</sup> Linden describes several “split-brain” studies in which subjects perceive information with only one of the hemispheres of the brain exposed to an image and the other hemisphere exposed to a different image.<sup>144</sup> When asked to describe the images, subjects typically weaved together a story that makes consonant the dissonant images.<sup>145</sup>

---

<sup>140</sup> WESTEN, *supra* note 3, at xiv.

<sup>141</sup> LINDEN, *supra* note 3, at 221–34.

<sup>142</sup> *Id.*

<sup>143</sup> *Id.* at 225.

<sup>144</sup> *Id.* at 226–29.

<sup>145</sup> *Id.* 227–28.

## SCIENTIFIC INNOVATIONS AND PRACTICAL APPLICATIONS

Taken together, Linden's and Westen's work has important implications for people engaged in settlement. We have an old brain and a newer brain, and they both contribute to our thinking. When they are in discord, the old brain usually wins. It was probably the case at some time that discordant information served as a form of alert for predators, or a method to call attention to unintended nonconformity with the social order. Something "out of whack" draws greater attention in the parts of your brain that attend more to survival than to enlightenment. Behavioral biology teaches us that human behavior is, in large measure, the product of a more primitive, longer period of evolutionary history than is the modern age (and certainly the digital age). Humans are dragging old brains along for a ride into the future. Those old brains still hear a bus go by and react as if a large animal or pack of animals were passing.

The newer brain can sometimes observe the dialogue between itself and the old brain. There can be a conscious internal dialogue in which the new brain notices the old brain's animal-like reaction to a situation, and by bringing the mind's attention to the present ("no pack of animals here—just a bus"), the new brain soothes the old. It is just as easy to conjure scenarios in which the new brain stirs the old brain up. In 2009, reading news stories about a possible H1N1 pandemic may be enough to incite paralyzing fear in the old brain.

There are enormous implications for mediators and negotiators to be drawn from this body of work. For example, mediators ought to be cognizant that discordant information is likely to activate a neural-emotional pattern originating from a bygone era, and the consequences are likely to be physical, and therefore psychophysical. It is well documented that by the time one becomes conscious he is afraid, his body has increased the blood supply to the legs in preparation for freeze, fight, or flight responses. It is reasonable to infer that the effects of discordant information that activate primitive parts of the brain may have similar effects in mediation. When a mediator finds it necessary to question why a party rejects a good offer, he may need to raise doubts about some of the assumptions underpinning the party's stance. The mediator may try to point out weaknesses in the party's arguments and strengths in the other side's case. He may suggest that the party is assessing risky situations optimistically. For example, a party may believe that they have an 80% chance of prevailing on an important evidentiary motion, which may be, in the opinion of the mediator, an unduly optimistic forecast.

In instances where the mediator has to present dissonant information to a party who overvalues her own ideas and undervalues her opponent's, the mediator ought to know this is likely to be a time when the executive

function of the listener's brain is likely to be more reactive than proactive. When a mediator has forced a party to consider that their arguments may be flawed and that their opponents' arguments and offers have merit, it may not be a good time to ask for a concession, despite the temptation to force a concession during a moment of perceived weakness.<sup>146</sup>

Moreover, the idea that two brains wrestle for emotional dominance suggests that it is not sufficient to create proposed resolutions that "sound good." The solutions must "feel good" as well. In other words, settlement has to happen with the amygdala and the cortices both on board for the ride. Finally, it seems that if a mediator can activate the amygdala in a way that makes settlement "feel good," the amygdala will help construct stories that satisfy the cortices, but that relationship is not symmetrical. The mediator should try to bring both brains along, but if he has to choose one, he should choose the older brain as the ally in persuasion.

#### *D. Phase Four—Thinking About Offers: Presentism and Problems Associated with Predicting State of Mind*

If all goes well in a mediation or negotiation, there will come a point when parties formulate and evaluate offers and compromises. At this juncture, parties are encouraged—by mediators or by leading negotiation texts—to stop dwelling on the past, stop thinking about blame for past actions and retribution therefore, and start thinking prospectively and become "future oriented."<sup>147</sup> Mediators rely on parties imagining a future filled with misery-inducing depositions, cross-examinations, and legal bills, and to compare that to an unburdened future in which the parties presumably spend their newfound free time in less miserable activities than litigation.

However, mediators ought to rid themselves of the illusion that this technique is effective because it does what it purports to do. Helping parties

---

<sup>146</sup> I am more confident that I can say that the older, earlier evolved midbrain is the dominant engine in decisionmaking in the face of dissonant information than I am confident in offering the best tactic for dealing with the neuroscientific effects. As in many other situations, a mediator has to decide whether it is best to take parties as they come and deal with or exploit their emotional states, or to soothe them until they can "bargain rationally." This ethical situation is no different here than in other situations and I cannot offer a sure-fire cure-all. But there is a part of me that believes that no one should accept an offer unless the intellectual part of their brain is on board. I like to think that people understand the tradeoffs in their interests between any particular offer and other options (litigation, more negotiation).

<sup>147</sup> See, e.g., FISHER ET AL., *supra* note 31; CHRISTOPHER MOORE, THE MEDIATION PROCESS: PRACTICAL STRATEGIES FOR RESOLVING CONFLICT (3d ed. 2003); Michael Moffitt, *Pleadings in the Age of Settlement*, 80 IND. L.J. 727 (2005).



## SCIENTIFIC INNOVATIONS AND PRACTICAL APPLICATIONS

envision alternative futures may help settle cases by casting competing visions of the future in the minds of parties, but there is reason to believe that the scenarios they envision are wholly unrelated to the feelings of happiness or misery they will feel when they do settle or continue with the litigation. Two excellent works by Daniel Gilbert and Dan Ariely demonstrate the problems associated with forecasting how one will feel in the future.

In his best-selling book, *Stumbling on Happiness*, Harvard Psychologist Daniel Gilbert boldly states that “[t]he human being is the only animal that thinks about the future.”<sup>148</sup> He points out that we do it badly. Through his discussion, Gilbert expertly demonstrates that the brain fills in blank spots with fabricated data in much the same way as David Linden and Drew Westen do in their abovementioned works.<sup>149</sup> For example, Gilbert uses an optical illusion to show that there is a blind spot in the eye.<sup>150</sup> The viewer of the illusion is instructed to close her left eye and look at the leftmost of a pair of images on a page—a magician on the left and a globe on the right.<sup>151</sup> The viewer moves the page toward his nose and at some point the globe disappears.<sup>152</sup> Gilbert explains that when the globe is in the blind spot, the eye sees white space all around the area of the blind spot and fills in the blind spot with nearby data. The viewer thinks she see a white spot where there is a globe, but she sees nothing and her brain “fixes it” for her.<sup>153</sup> Gilbert moves on past the optical illusion to demonstrate that people fill in words as well as images, and he notes that eyewitness accounts of events are rife with false remembrances. He makes a persuasive case that the human mind is expert at “filling in holes.”

After a discussion of how the past is part memory and part “spackle,” Gilbert turns to studies on envisioning the future, and he demonstrates that people are near incapable of determining what will make them happy in an imagined future.<sup>154</sup> “If the past is a wall with some holes (in need of spackle), the future is a hole with no walls. Memory uses the filling-in trick, but imagination is the filling-in trick, and if the present lightly colors our remembered pasts, it thoroughly infuses our imagined futures.” Gilbert discusses using the visual and auditory areas of the brain to create the human

---

<sup>148</sup> DANIEL GILBERT, *STUMBLING ON HAPPINESS* 4 (2006).

<sup>149</sup> *Id.* at 9–16.

<sup>150</sup> *Id.* at 75–95.

<sup>151</sup> *Id.* at 82.

<sup>152</sup> *Id.* For me, about 14 inches from my face.

<sup>153</sup> For more on optical illusions and the fascinating learnings they can reveal, see EDWARD M. HUNDERT, *LESSONS FROM AN OPTICAL ILLUSION: ON NATURE AND NURTURE, KNOWLEDGE AND VALUES* (1995); see also Birke & Fox, *supra* note 47.

<sup>154</sup> GILBERT, *supra* note 148, at 113.

imagination and shows how present states of mind (for example, “I am so full I will never eat again”) are a product of a uniquely human set of brain processes that lead us to mispredict our future preferences (for example, “funny . . . only two hours later and I am ready to eat some more of that Thanksgiving turkey . . . and maybe a small piece of pie. . .”).

With regard to preferences, Gilbert shows that when asked whether we would like to eat our favorite meal at our favorite restaurant once per month, or whether we would like more variety in what we eat, we choose variety. But when a meal other than our favorite comes, we are mildly disappointed and we wish we had ordered our favorite. Why? Because humans treat sequential alternatives as if these alternatives were simultaneous.<sup>155</sup> We think about all dozen meals at once when we are deciding what we will want in the future (simultaneous), but when we experience them with a month interval between them (sequential), the favorite meal is “fresh” every time.

Gilbert demonstrates that predictions of the future are rooted in images from the present so they are unreliable indicators of what will come to pass.<sup>156</sup> For example, people overestimate the effect of a catastrophe today on their lives a year or two from now. People asked to think about how they would feel after losing a limb or a loved one generally predict that they would feel terrible about the event at the time it occurred, and that they would continue to feel terrible about it a year or two later. However, people who have suffered these tragedies and who are interviewed a year or two later have other things on their mind.<sup>157</sup> Two years after losing a leg, an individual is more affected by whether she has a cold, has gotten a promotion, suffered some other more recent loss, won the lottery, or some other similarly unrelated and unpredictable event than by the loss of the leg.

A corroborating work by MIT Neuroeconomist Dan Ariely shows that when people try to predict their future feelings, they underestimate the impact of their state of mind at the time of the actual decision.<sup>158</sup> For example, male college students were asked whether they would engage in a variety of coercive behaviors in order to persuade an unwilling female participant to engage in sexual relations.<sup>159</sup> Some of these were “milder”

---

<sup>155</sup> *Id.* at 133.

<sup>156</sup> “Because we naturally use our present feelings as a starting point when we attempt to predict our future feelings, we expect our future to feel a bit more like our present than it actually will.” *Id.* at 137 (footnote omitted).

<sup>157</sup> See, e.g., *id.*

<sup>158</sup> Dan Ariely & George Loewenstein, *The Heat of the Moment: The Effect of Sexual Arousal on Sexual Decision Making*, 19 J. BEHAV. DECISION MAKING 87, 89–90 (2006).

<sup>159</sup> *Id.*

## SCIENTIFIC INNOVATIONS AND PRACTICAL APPLICATIONS

behaviors, like asking a second time to go on a date even after being rejected, and some were criminal or near-criminal in nature (threats and the like).<sup>160</sup> When in a “cold” state (not sexually aroused), the men predicted that they would be very unlikely to engage in any of the behavior, including the mildest forms.<sup>161</sup> In an aroused state, the men’s responses were markedly different.<sup>162</sup> They were substantially more likely to predict they would engage in coercive behavior when they were in an aroused state.<sup>163</sup> There is reason to believe that the aroused participant could better predict his behavior in the aroused state than the unaroused participant could predict his aroused-state behavior.

Taken together, these studies first show that not all good neuroscience is the product of fMRI pictures, but more importantly that it is simply not reasonable to ask a party in a lawsuit to predict how they will feel when the lawsuit is over. Whether they will feel good or bad in a day or a week or a year depends on many variables that have nothing to do with the lawsuit. It may be the case that parties would prefer the demands of litigation to the pangs of regret that they may feel post-settlement.<sup>164</sup>

### *E. Phase Five—Closing in on the Deal: Loss Aversion and the FMRI*

At the cusp of every settlement, parties must compare a particular deal with their walkaway alternatives. They must compare a sure thing (settlement) to a risky alternative (continued litigation).

One of the most powerful tools in the negotiator or mediator’s toolbox is the ability to frame this decision in a way that maximizes the likelihood of settlement. Among the best understood of the methods of framing is loss aversion.<sup>165</sup> Research shows that people are generally risk-seeking when facing certain losses and risk-averse when facing certain gains. That is, gambling “double or nothing” is much more attractive when you are down than when you are up. Prospect theory, the Nobel-prize winning theory promulgated by Amos Tversky and Daniel Kahneman, demonstrates that people are more sensitive to losing money or objects than to gaining the same

---

<sup>160</sup> *Id.*

<sup>161</sup> *Id.* at 91–95.

<sup>162</sup> *Id.*

<sup>163</sup> *Id.*

<sup>164</sup> For more on anticipated regret and its projected impact on decisionmaking in law, see Chris Guthrie, *Better Settle than Sorry: The Regret Aversion Theory of Litigation Behavior*, 1999 U. ILL. L. REV. 43 (1999).

<sup>165</sup> Kahneman & Tversky, *supra* note 5.

amount. “[P]eople typically require a potential gain of at least \$100 to make up for exposure to a potential loss of \$50 because the subjective impact of losses is roughly twice that of gains.”<sup>166</sup>

In mediation, awareness of this principle can result in mediators asking plaintiffs to think of their baseline expectation as zero (“If there is no settlement today, you get nothing . . . in fact you spend more money soon”), and to consider a settlement offer as a gain. Then the trial is a chance to gamble for a bigger gain. For defendants, the focus is on certain losses—the trial will cost a certain amount to defend, to which should be added the expected value of the potential loss at trial. If that is the baseline, an offer can be perceived as guaranteed savings, and the trial as a risky chance for future savings.

A neuroscientific reason now exists for mediators to be concerned about framing in a way that highlights possible losses. In *The Neural Basis of Loss Aversion in Decision-Making Under Risk*, Sabrina M. Tom, Craig R. Fox, Christopher Trepel, and Russell A. Poldrack sought to determine “[w]hether loss aversion reflects the engagement of distinct emotional processes when potential losses are considered.”<sup>167</sup> The authors noted that sensitivity to loss was often thought about as having associations with negative emotions, and most specifically fear and anxiety. This inquiry is important for negotiators and mediators, because if loss aversion were based in a fear response, mediators might wish to intervene at the time of consideration of acceptance of a deal—and the attendant loss that comes with giving up one’s right to vindicate herself in court—in a way that deals with the fear of loss.

Tom and her colleagues put subjects in the fMRI and allowed them to respond to accept (strongly or weakly), reject (strongly or weakly), or show indifference to proposed gambles with varying degrees of risk. The gambles were real—that is, the subjects were “playing” for real dollars that they got to keep. Amounts ranged from \$10 to \$40 gains and \$5 to \$20 losses (replicating the 2/1 gain/loss sensitivity). Brain imaging data surprised the researchers. When analyzing the data to determine which brain regions were activated during the studies, the scientists found there was a “gain responsive network” which included “regions previously shown to be associated with the receipt of monetary rewards”<sup>168</sup> The researchers hypothesized that if loss aversion were driven by fear, they would find increased activity in the brain

---

<sup>166</sup> Sabrina M. Tom et al., *The Neural Basis of Loss Aversion in Decision-Making Under Risk*, 315 Sci. 515, 515 (2007).

<sup>167</sup> *Id.*

<sup>168</sup> *Id.* at 516. These regions are the dorsal ventral striatum, the ventrolateral prefrontal cortex, the anterior cingulate cortex, the VMPFC, the OFC, and dopaminergic midbrain regions.

## SCIENTIFIC INNOVATIONS AND PRACTICAL APPLICATIONS

regions associated with such emotions, and as losses increased, brain activity in these regions would increase. However, rather than seeing increased activities in the fear centers, researchers saw decreased activity in the reward centers.<sup>169</sup> The portion of the brain associated with a variety of pleasurable sensations was stimulated in gain frames and was suppressed in its activation in loss frames.

In the context of deciding in mixed gain-loss situations, fear of loss is an inappropriate characterization. Instead, concern about loss more likely leads to an inability to envision pleasant scenarios, which in turn may inhibit parties' ability to weigh the value of settlement against the value of continued litigation.

If loss aversion suppresses the ability to imagine reward, it may have additional effects on one's ability to think creatively about how to meet their desire for reward. If loss aversion is based in a creativity suppression response, it may be a very bad thing during brainstorming to create a loss frame of mind in parties. However, it may be a useful tool at the end of the day. If things look stark at the end of the day, that is probably not a bad thing. In fact, mediators often report that they become increasingly evaluative as the day wears longer. Perhaps this increasing impatience demonstrated by mediators and others may be an evolutionary response to a dulled decisionmaker, who, after assimilating the loss of an expectation that typically attends compromise and settlement, cannot imagine which would provide more reward: settlement or trial. Neuroscience may give mediators reason to reserve their attempts at loss framing for those times in mediation when parties are in greatest need of forceful direction.

### *F. Last Ditch Efforts—Mediator Proposals: Invoking Involuntary Pleasure*

When a mediation gets stuck and it looks like the session might end without a settlement, the mediator faces a choice of whether to offer a proposal. There is much debate about whether a mediator should ever become directive such that he pushes parties to settle. Conventional wisdom suggests that a mediator should not be an advocate for a settlement of his own creation, but should instead act as a counselor to the parties, helping them to compare options with alternatives and making informed choices. According to a "party centered approach," if parties cannot decide near the

---

<sup>169</sup> *Id.* at 517 ("[T]he present study demonstrates that, in the context of decisionmaking, potential losses are represented by decreasing activity in regions that seem to code for subjective value rather than by increasing activity in regions associated with negative emotions.").

end of the day, a mediator should not tell them where they should settle, as that is a decision only the parties should make. However, if a mediator agrees to make an affirmative proposal, should he be concerned about this being a breach of the mediator aspiration of a “party-driven” process?

Perhaps the strictest of ethicists would say never to make a proposal and that a mediator proposal is a per se ethical breach. However, a study by William Harbaugh, Ulrich Mayr, and Daniel Burghart at the University of Oregon muddies the waters. These scientists examined how subjects reacted when put into the fMRI to see if evidence could be gathered to support competing theories of giving: “pure altruism” (giving motivated only by concern for the objects of the charity), or “warm glow altruism” (giving motivated by the positive feeling one feels when giving).<sup>170</sup> The subjects’ brains were scanned when they were making voluntary donations to a food bank, and when they were forced to make involuntary payments.<sup>171</sup> The subjects each started with a real money bank account, and the charity was a real local charity that would actually receive the money. The scientists observed that the brain signature was remarkably similar in both the donation and the tax situations.<sup>172</sup> In finding support for the “warm glow” theory, they reported:

This is the first evidence we know of demonstrating that mandatory taxation for a good cause can produce activation in specific brain areas that have been tied to concrete, individualistic rewards. . . . The fact that mandatory transfers to a charity elicit activity in reward-related areas suggests that even mandatory taxation can produce satisfaction for taxpayers.<sup>173</sup>

When first published, this work was reported across the nation.<sup>174</sup> One of the least liked laws—forced taxation—produced the same effect on the brain as a voluntary donation to charity.<sup>175</sup>

---

<sup>170</sup> William T. Harbaugh et al., *Neural Responses to Taxation and Voluntary Giving Reveal Motives for Charitable Donations*, 316 SCI. 1622, 1622–24 (2007). My most charitable friend says “don’t give ‘til it hurts; give ‘til it feels good.”

<sup>171</sup> *Id.*

<sup>172</sup> That is, the ventral striatum, an area known to activate in the presence or reward, was activated equally in both conditions. *Id.* at 1624.

<sup>173</sup> *Id.* at 1623–24.

<sup>174</sup> John Tierney, *Taxes a Pleasure? Check the Brain Scan*, N.Y. TIMES, June 19, 2007, at F1.

<sup>175</sup> *Id.* It is worth noting that while subjects indicated a preference for having more choice rather than less (manifesting as a stated preference for voluntary donations over forced taxation), having choice actually decreased the amount of giving to support the

## SCIENTIFIC INNOVATIONS AND PRACTICAL APPLICATIONS

A follow-up piece adds a review of the economic and neuroeconomic literature on charitable giving, and inclusion of a third possible motivation for giving dubbed “impure altruism” (giving motivated by expected rewards due to reputational enhancement). The bottom line remains the same: people’s sense of what will make them feel good is not accurate, and a forced concession feels about as good as a voluntary one.<sup>176</sup> While mediators should not make too much out of too little data, resolution of conflicts is something that may be worth pushing to the edge of ethics, and lasting satisfaction can come from coercive environments. In short, maybe a mediator’s proposal, even if argued forcefully, produces the greater good if it generates forced concessions resulting in closure.

## V. CONCLUSIONS

Neuroscience, like most disciplines, provokes more questions than it answers. While there are studies that are widely accepted that corroborate and sometimes further existing knowledge about decisions, there are also studies that are merely directional and ought not to be counted on as proof of anything, but instead as evidence for an unproven set of propositions. As a colleague expressed to me, the Nobel Prize in Neuroeconomics will be based on a paper that has not been written yet. This statement sums up the field quite well in that it implies that the application of neuroscience to decisionmaking will yield results worthy of a Nobel Prize, but that the field is too much in its infancy to have yet created a Nobel Prize worthy contribution.

A further defense of the work comes from Professors Mayr, Harbaugh, and Tenkersley, who write:

[N]eural data provide a way of testing economic models that is very different from the empirical and experimental data that have been typically used. This presents the possibility of independent evidence in favor of, or against, various models of behavior. . . . neural evidence builds on a rich base of knowledge from animal physiology and from human brain imaging work about the functional relevance of specific neuroanatomical areas. This means that there is the potential for generating interesting new hypotheses about motivations from observed patterns of neural activations...results can feed back into the neuroscience literature and further increase our general

---

public good.

<sup>176</sup> Harbaugh, *supra* note 170, at 308.

understanding of how the brain makes decisions and experiences their consequences.<sup>177</sup>

However, long before that Nobel Prize-worthy work is written, and before experiencing Mayr and friends' "increase in general understanding," many fMRI experiments will take place and many lawsuits will be settled through negotiation and mediation. Aligning experiments and settlement activities might produce both better science and better dispute resolution techniques. A necessary precondition is that a dialogue must be nurtured between neuroscientists and dispute resolution professionals, but that dialogue needs to be structured to overcome differences between the disciplines. I highlight three important issues in the remaining pages.

#### *A. There is Tension Between Research and Practice*

Tension exists between scientists and practitioners, in that scientists err on the side of caution and practitioners are more willing and sometimes eager to incorporate unproven hypotheses into their work. Scientists are quick to point out the limitations of neuroscience. The fMRI, for example, as useful as it is, does not show pictures of emotions, but instead shows magnetic signals demonstrating activation in parts of the brain. These activated parts of the brain may be associated with particular functions, but may not be necessary to perform that function. Further, the link between activation and action is not known to be causal, but clearly is correlative.<sup>178</sup> Proof of necessity must be achieved through other means, currently the study of lesions or transcranial magnetic stimulation studies, each of which has weaknesses of its own. Moreover, concepts discovered in cognitive psychology fail to map onto a single and dedicated area of the brain, making it impossible to make reverse inferences, that is to "infer the presence of specific mental processes" from observations of activation.<sup>179</sup> The visual cortex may activate during sight, but it also lights up during visualization. The best technology provides directional data that will lead to the type of discoveries that practitioners hunger for; but that day is not upon us yet.<sup>180</sup>

---

<sup>177</sup> William Harbaugh et al., *Neuroeconomics of Charitable Giving and Philanthropy*, in *NEUROECONOMICS: DECISION MAKING AND THE BRAIN* 308–18 (Paul W. Glimcher et al. eds., 2008).

<sup>178</sup> Poldrack, *supra* note 9, at 223.

<sup>179</sup> *Id.*

<sup>180</sup> *Id.* at 225 ("I believe that [fMRI and TMS] will provide the basis for the next generation of neuroimaging in combination with more detailed models of neural connectivity and computational modeling.").



### B. *The Need for Collaborative Creation of Testable Hypotheses*

Scientists who knew that their life's work would have no meaningful impact on the world—including forming the basis for a future important finding—might be depressed. Similarly, mediators who thought they were employing useful interventions might be upset to realize that settlements were occurring despite their harmful tactics. Surely, by working together, each group can avoid its respective fears, being either “correct but irrelevant” in the case of science, or “of moment and wrong” in the case of dispute resolvers. Indeed, they can bridge the gap between science and practice.

In a Venn diagram that describes the set of all possible hypotheses that neuroscientists might wish to test and the set of all possible hypotheses that negotiators and mediators might find useful to test, there is overlap. The initial challenge is for them to meet—until fMRI decision theorists start to take up residence in law schools or law professor-decision theorists start to occupy medical school faculty positions, pioneers from each group must take the initiative.<sup>181</sup>

In the hope of furthering this nascent conversation, I offer the following hypotheses useful to negotiators and mediators that might be amenable to testing by neuroscientists. Or, perhaps a neuroscientist will explain to me why these hypotheses are fundamentally flawed. Either way, the conversation continues and both dispute resolution and neuroscience are the better for it.

#### SET ONE: Fear and Creativity

- Being in a fearful state will result in closemindedness to creative offers.
- There are verbal interventions likely to induce fear.

---

<sup>181</sup> One fledgling effort by a group called the Master Mediators Institute brought a group of approximately twenty mediators to the Cognitive Neuroscience Center at Duke University for an immersion course in neuroscience. Participants dissected a brain, watched an fMRI test, and discussed the overlap between our fields with a distinguished group of mediators for four days. While no concrete product emerged, the event demonstrated the difficulty and potential upside of finding that intersection. For information about the event, see Robert Benjamin, *The Science Behind the Sense: Exploring Cognitive Neuroscience, in Decision Making*, THE MASTER MEDIATOR INSTITUTE, Apr. 2009, available at [http://mastermediatorinstitute.org/MMI/?page\\_id=420](http://mastermediatorinstitute.org/MMI/?page_id=420). Further, while it is not a statistically significant survey, on the half dozen or so occasions I have presented on this topic, attendance exceeds expectations. There is curiosity on the ground, and practitioners and academics in dispute resolution need to continue to reach out.

- There are likewise interventions that are effective in calming fearful people.
- If such interventions could be documented, mediators could enhance the likelihood of a creative solution if they refrain from inducing fear or if they could effectively calm fearful individuals.

#### SET TWO: Realigning Fear Networks

- The catharsis that comes with telling a story is the result of a party's realigning scattered and discordant neural impulses in a way that makes the network more efficient and the memory more readily understood.
- Effective listening and reframing by a mediator contribute to this positive realignment.
- After a mediator helps realign a negative neural pattern into something more positive (or less fear inducing), the fear moves closer to extinction, even after the mediator is no longer present.

#### SET THREE: Mediation and Mirroring

- The introduction of a mediator in the chain of communication produces an effect on the impact of mirror neurons to effectively guide parties to common emotional understanding.
- The longer the time between when a party communicates to a mediator and when that mediator transmits the information to the receiving party, the less alike the neural patterns of the speaker and the receiver. Conversely, the shorter the time lapse, the more effective the mediator is in inducing the speaker's emotional state to the receiver.

### *C. A Mediated Burden of Proof—Resonance*

Practitioners cannot wait for scientific certainty, but they are equally ill-advised to build practices on data that are at times scanty and other times mistranslated. I suggest that neuroscience may provide hypotheses that can withstand the internal scrutiny that mediators and some self-aware negotiators may be well-suited to test.

Neuroscience shows that all human brains share similarities in their physical makeup and functionality. While humans' behaviors are not similar, the manner in which we process data or mediate conversations between the old and new brain may be more universal, like facial expression. The freeze/flight/flight response seems to be rooted in something common to the entire species. Perhaps other behaviors are as well. Mediators and negotiators

## SCIENTIFIC INNOVATIONS AND PRACTICAL APPLICATIONS

might be justified in assuming that certain aspects of their experience of the world are not eclectic or unique to them. If a negotiator or mediator could extrapolate from their own reactions to an offer, a concession, or any other part of the settlement process, he might be able to better understand the likely impact of the offer or concession to the other side. A negotiator or mediator could choose interventions consonant with the brain's natural methods of assimilating and evaluating information, and making decisions.<sup>182</sup>

Self-reflective practitioners of dispute resolution have found, and examined through introspection, parts of their behavior and decisionmaking processes, many of which are likely species-specific. Through understanding their own feelings and reactions, they understand the feelings and reactions of others. As biology is foundational, truths for all must be truths for the individual negotiator and mediator. If, while practicing, these professionals unearth potential decisionmaking commonalities, neuroscientists may find it possible and productive to confirm these hypotheses in the lab. For the mediator, the only current tool available is to keep up with the emergent literature on neuroscience, and then to self-test a concept for resonance. Peer review may remain the standard for publication in scientific journals, but lawyers are comfortable with lower standards of proof. Trial lawyers introduce scientific evidence into court based on standards different than those of scientists. Why should mediators be discouraged from having a different standard for their practices? The matter is akin to the difference between a criminal and a civil burden of proof: Scientists need something like "proof beyond a reasonable doubt" in order to be credible to their peers, while mediators and negotiators are forced by practical considerations to employ a standard closer to "preponderance of the evidence." The appropriate standard for a negotiator or mediator to use when considering whether a piece of neuroscience is sufficiently well developed to be used in her practice is whether the findings from a study resonate with her experience of the world. In the case of mirror neurons, where there exists disagreement in the scientific community, resonance is all we have.<sup>183</sup> The central inquiry in this article is whether neuroscience has produced findings that are sufficiently established such that mediators ought to incorporate

---

<sup>182</sup> Owen Jones refers to this concept in lawmaking as "The Law of Law's Leverage." The more a piece of law accords with basic biological human tendencies, the more likely it is to be obeyed. See Owen Jones, *supra* note 8, at 2100–01.

<sup>183</sup> As mentioned above, there are many scientists who both disbelieve and believe in mirror neurons. A more instinctual approach is seen in the work of Dr. David Linden, who writes that "[w]e assume, rightly I believe, that mirror neurons are also present in humans. But at the time of this writing that has not been confirmed." LINDEN, *supra* note 3, at 105. Linden is a professor of neuroscience at the Johns Hopkins University.

these findings into their practices. To most neuroscientists, the answer would likely be “not yet.” However, to most mediators, and to me, the answer is “yes.” It is a certainty that neuroscience has earned a place with the other three methods used to understand dispute resolution practices. It does not supplant psychology, economics, or self-study, and it does not fit neatly under any of these categories. Rather, in a short period of time, neuroscience has become a robust source of new data and hypotheses, reaching maturity in a blink of an eye relative to peer disciplines.

There is much that has not been covered in this article. There has been no discussion of the effect of music on the mind—should mediators consciously choose a settlement soundtrack?<sup>184</sup> There has been no discussion of oxytocin and smells, despite confirmation that they have an impact on people’s willingness to get along.<sup>185</sup> I have not discussed a variety of documented states of mind that may impede mediation, including sleep deprivation and its effect on choices about gains and losses.<sup>186</sup>

Rather than pretend that one article can possibly describe all the ways in which the new science of brain and mind may apply to the resolution of disputes and the creation of deals, my hope is more modest. I hope that this article has effectively cautioned readers to sift neuroscientific wheat from chaff, and has inspired them to read more about neuroscience, to create hypotheses to test, and to seek out local neuroscientists and discuss how work in the field relates to work in the laboratory. Perhaps one day neuroscience will radically alter or supplant those other fields, but that day is not yet upon us. Between now and the first Nobel in neuro-decisionmaking,

---

<sup>184</sup> See, e.g., DANIEL LEVITIN, *THIS IS YOUR BRAIN ON MUSIC: THE SCIENCE OF A HUMAN OBSESSION* (2007); OLIVER SACKS, *MUSICOPHILIA: TALES OF MUSIC AND THE BRAIN* (Vintage Books 2008) (2006).

<sup>185</sup> *Hormone Involved in Reproduction May Have Role in the Maintenance of Relationship*, SCI. DAILY, July 14, 2009, available at <http://www.oxytocin.org/oxytoc> (“The hormone best known for its role in inducing labor may influence our ability to bond with others, according to researchers at the University of California, San Francisco.”); M.J. Stephey, *Can Oxytocin Ease Shyness?*, TIME, July 21, 2008, <http://www.time.com/time/health/article/0,8599,1820828,00.html>.

Best known for controlling contractions during labor [, oxytocin] also plays a key role in other fundamental human urges—including the desire to connect with others. ‘Somehow, the peptide increases trust, or alters the way individuals see each other,’ says Tom Insel, director of the National Institute of Mental Health.

*Id.*

<sup>186</sup> See, e.g., V. Venkatraman et al., *Sleep Deprivation Elevates Expectation of Gains and Attenuates Response to Losses Following Risky Decisions*, 30 SLEEP 603 (2007).

## SCIENTIFIC INNOVATIONS AND PRACTICAL APPLICATIONS

readers should see neuroscience as a helpful addition to economics, cognitive and behavioral psychology, and self-awareness.<sup>187</sup> Armed by what I have read, I intend to have longer joint sessions, to take a break after a party tells me about the harrowing events underlying the litigation, to be circumspect about my ability to help a party envision whether a settlement will create more peace of mind than continuing litigation, and perhaps to press a little harder at the end for resolution—that is, until some willing and interested neuroscientist teaches me otherwise.

---

<sup>187</sup> At least a trio of credible neuroscientists agrees that behavioral science and neuroscience make excellent bedfellows. John A. Clithero, Dharol Tankersley, and Scott A. Huettel write:

By identifying interesting choice behavior and creating models for the associated cognitive processes, neuroeconomics research can generate better paradigms for human neuroimaging studies and target behavior to replicate in animal and clinical studies (behavior). By grounding conclusions about brain function in behavioral effects such as choice parameters or individual decisions, neuroeconomics can unify cognitive and neural theories of behavior.

John A. Clithero et al., *Foundations of Neuroeconomics: From Philosophy to Practice*, 30 PLOS BIOL. 2348 (2008).

