

ARTICLES

Harnessing Virtual Reality to Prevent Prosecutorial Misconduct

KATE E. BLOCH*

ABSTRACT

*Prosecutorial failure to disclose material exculpatory evidence has put innocent people on death row and left others languishing in prison for decades. More than half a century ago, in *Brady v. Maryland*, 373 U.S. 83 (1963), the U.S. Supreme Court held that the Constitution requires prosecutors in criminal cases to disclose such evidence to the defense. Scholars now attribute much of this failure to cognitive biases, which can cause distortions in information processing. This Article proposes a novel approach for preventing such prosecutorial error. Applying recent advances in cognitive science research, the Article explores the potential for immersive virtual experiences to disrupt cognitive biases. Disrupting such biases could enable prosecutors to more effectively see the exculpatory nature of evidence and be inclined to disclose that evidence. If the power of digital avatars can be harnessed for this purpose, avatars may reinforce or re-introduce self-regulation as a first line of defense against Brady violations.*

TABLE OF CONTENTS

INTRODUCTION	3
I. OVERVIEW OF BRADY V. MARYLAND	8

* Professor of Law and Harry & Lillian Hastings Research Chair, University of California Hastings College of the Law. I owe a debt of gratitude to a number of thoughtful and generous colleagues who provided invaluable guidance and encouragement at various stages of this Article’s development, and, in particular, to Hadar Aviram, Jeremy Bailenson, Alafair Burke, Carrie Leonetti, Rory Little, Emily Murphy, Allison Redlich, Natalie Salmanowitz, Robert Sapolsky, Bobbie Ticknor, Jenia I. Turner, and Lois Weithorn. I also want to thank Hank Greely and all those who made possible the 2018 Stanford Law School BioLawLapalooza Conference, as a result of which I received insightful feedback on this scholarship. Thank you also to my research assistant, Belle Yan, and to the editorial team at *The Georgetown Journal of Legal Ethics* for their fine work during the editing process. Finally, I am grateful for the funding provided by the Harry & Lillian Hastings Research Chair. © 2019, Kate E. Bloch.

II.	UNDERSTANDING <i>BRADY</i> ERROR	11
A.	CATEGORY ONE: PROSECUTORIAL LACK OF AWARENESS OF EVIDENCE IN THE POSSESSION OF LAW ENFORCEMENT	13
B.	CATEGORY TWO: PROSECUTORIAL AWARENESS OF EVIDENCE BUT FAILURE TO RECOGNIZE <i>BRADY</i> NATURE	14
C.	PROSECUTORIAL AWARENESS OF EVIDENCE AND RECOGNITION OF <i>BRADY</i> NATURE	14
D.	ALL THREE CATEGORIES: COGNITIVE BIAS DRIVEN EXPLANATIONS	16
1.	COGNITIVE BIAS AND CATEGORY ONE ERROR	19
2.	COGNITIVE BIAS AND CATEGORY TWO ERROR	21
3.	COGNITIVE BIAS AND CATEGORY THREE ERROR	22
III.	THE GUILT PERSPECTIVE, COGNITIVE BIAS, AND PROPOSED REMEDIES IN THE SCHOLARLY LITERATURE	24
A.	IMPROVING CHARGING ACCURACY PRIOR TO ATTACHMENT OF GUILT PERSPECTIVE	25
B.	PROFESSIONAL AND CONVICTION INTEGRITY PROGRAMS	26
C.	COGNITIVE BIAS TRAINING	27
D.	INVOLVING UNBIASED DECISION MAKERS	27
E.	OPEN-FILE POLICIES	29
F.	SWITCHING ROLES	33
IV.	SCIENTIFIC RESEARCH ON VIRTUAL REALITY, EMBODIED PERSPECTIVE TAKING, AND DIGITAL AVATARS	36
A.	EMPIRICAL RESEARCH ON DIGITAL AVATARS AND COGNITIVE BIAS	36
1.	EMPIRICAL RESEARCH ON DIGITAL AVATARS, COGNITIVE BIAS, AND RACE	38
2.	RESEARCH ON AVATARS, COGNITIVE BIAS, AGE, DISABILITY, AND HOMELESSNESS	42
B.	RESEARCH ON AVATARS TO CHANGE BEHAVIOR IN ENVIRONMENTAL CONSERVATION AND EXERCISE	44

V. AVATARS AND <i>BRADY</i> EVALUATIONS	46
VI. POTENTIAL BENEFITS & DRAWBACKS TO DIGITAL AVATARS IN THE <i>BRADY</i> CONTEXT	48
A. BENEFITS	49
B. DRAWBACKS	52
CONCLUSION	56

INTRODUCTION

It was the confession of a man facing death, but not the man convicted of the capital crime.¹ This confession came from the terminally ill prosecutor, whose suppression of evidence many years earlier had helped put the accused on death row.² In *Connick v. Thompson*, a prosecutor admitted deliberately withholding evidence, evidence that would subsequently lead to the exoneration of the accused.³

Prosecutorial failure to disclose material exculpatory evidence can violate the U.S. Constitution and undermine justice. The Supreme Court’s decision in *Brady v. Maryland*, which gave voice to this constitutional requirement, dates to 1963, more than half a century ago.⁴ Yet, court cases, like *Connick*, and related investigations bear witness to the continuing practice and detrimental consequences of such prosecutorial failure to disclose.⁵ As *Brady* focuses on the consequence to

1. *Connick v. Thompson*, 563 U.S. 51, 55–56 (2011); *id.* at 83–90 (Ginsburg, J., dissenting).

2. *Thompson*, 563 U.S. at 55–56, 56 n.1; *id.* at 83–90 (Ginsburg, J., dissenting).

3. *Thompson*, 563 U.S. at 76 (Scalia, J., concurring); *id.* at 83–90 (Ginsburg, J., dissenting).

4. *Brady v. Maryland*, 373 U.S. 83, 87 (1963).

5. *See, e.g.*, Ken Armstrong & Maurice Possley, *The Verdict: Dishonor*, CHI. TRIB. (Jan. 11, 1999), <http://www.chicagotribune.com/news/watchdog/chi-020103trial1-story.html> [<https://perma.cc/SW46-4DD5>]; *see also* *People v. Olsen*, 737 F.3d 625, 631–32 (9th Cir. 2013) (Kozinski, C.J., dissenting from denial of petition for rehearing en banc) (citing *Smith v. Cain*, 132 S. Ct. 627 (2012); *United States v. Sedaghaty*, 728 F.3d 885 (9th Cir. 2013); *Aguilar v. Woodford*, 725 F.3d 970 (9th Cir. 2013); *United States v. Kohring*, 637 F.3d 895 (9th Cir. 2011); *Simmons v. Beard*, 590 F.3d 223 (3d Cir. 2009); *Douglas v. Workman*, 560 F.3d 1156 (10th Cir. 2009) (per curiam); *Harris v. Lafler*, 553 F.3d 1028 (6th Cir. 2009); *United States v. Zomber*, 299 F. App’x. 130 (3d Cir. 2008); *United States v. Triumph Capital Grp., Inc.*, 544 F.3d 149 (2d Cir. 2008); *United States v. Aviles-Colon*, 536 F.3d 1 (1st Cir. 2008); *Horton v. Mayle*, 408 F.3d 570 (9th Cir. 2005); *United States v. Sipe*, 388 F.3d 471 (5th Cir. 2004); *Monroe v. Angelone*, 323 F.3d 286 (4th Cir. 2003); *United States v. Lyons*, 352 F. Supp. 2d 1231 (M.D. Fla. 2004); *Watkins v. Miller*, 92 F. Supp. 2d 824 (S.D. Ind. 2000); *United States v. Dollar*, 25 F. Supp. 2d 1320 (N.D. Ala. 1998); *People v. Uribe*, 76 Cal. Rptr. 3d 829 (Cal. Ct. App. 2008); *Miller v. United States*, 14 A.3d 1094 (D.C. 2011); *Deren v. State*, 15 So. 3d 723 (Fla. Dist. Ct. App. 2009) (per curiam); *Walker v. Johnson*, 646 S.E.2d 44 (Ga. 2007); *Aguilera v. State*, 807 N.W.2d 249 (Iowa 2011); *DeSimone v. State*, 803 N.W.2d 97 (Iowa 2011); *Commonwealth v. Bussell*, 226 S.W.3d 96 (Ky. 2007); *State ex rel. Engel v. Dormire*, 304 S.W.3d 120 (Mo. 2010) (en banc); *Duley v. State*, 304 S.W.3d 158 (Mo. Ct. App. 2009); *People v. Garrett*, 964 N.Y.S.2d 652 (N.Y. App. Div. 2013), *rev’d*, 23 N.Y.3d 878 (2014); *Pena v. State*, 353 S.W.3d 797 (Tex. Crim. App. 2011); *In re Stenson*, 276 P.3d 286 (Wash. 2012); *State v. Youngblood*, 650 S.E.2d 119 (W. Va. 2007)). *But see* Jerry P. Coleman & Jordan Lockey, *Brady “Epidemic” Misdiagnosis:*

the accused, rather than on the mental state of the prosecutor, *Brady* condemns the failure to disclose whether it is in good or bad faith.⁶

Recent scholarship on *Brady* error suggests that prosecutorial failure to disclose may often stem from cognitive processes that limit the prosecutor's awareness of the exculpatory nature of the evidence at issue or the importance of disclosing it.⁷ A substantial body of empirical evidence documents this phenomenon of cognitive bias generally.⁸ Research in this domain has identified dozens of varieties of cognitive bias.⁹ These mental processes may manifest explicitly or

Claims of Prosecutorial Misconduct and the Sanctions to Deter It, 50 U.S.F. L. REV. 199, 243, 207–08 (2016) (analyzing the 29 cases and opining:

There is a problem with *Brady* violations, but it is not an epidemic. . . .

[T]he most telling analysis of the twenty-nine cases is distinguishing *the manner* of, or cause behind, the suppression. This evaluation makes a *moral* or at least scholarly distinction, whether the suppression was done intentionally, recklessly, negligently, or not at all. The manner of suppression informs both the opprobrium to which an honest researcher can attach to the prosecution, as well as suggests the types of remedies to correct against future abuse. It also clearly draws a line between prosecutorial “misconduct,” as is universally decried, and mere trial “error”

Viewed through this final lens, the statistical presence of these categories of manner of suppression among the total population can be discerned as follows: thirteen cases (45%) comprise intentional suppression, which occurs where the prosecution was aware of exculpatory or impeaching evidence, yet willfully withheld it from the defense. Four cases (14%) can be fairly characterized as reckless, where the trial prosecutor was not personally aware of the favorable evidence, but willfully ignored his duty to search out such evidence in the files of his own office or partner investigative agencies. Another four cases (14%) were simply too unclear to make a definitive conclusion as to manner of suppression. Seven cases (24%) represent mere negligent suppression, meaning the prosecution was unaware of the favorable evidence, which was either actively withheld from it by a law enforcement partner or the evidence was hidden in a totally-unrelated investigation. Finally, one of the Kozinski 29 cases (3%) was reversed on appeal after Judge Kozinski noted it in his *Olsen* dissent (the final court to rule on the matter found no suppression by the prosecution, i.e., no *Brady* violation). (footnotes omitted).

6. *Brady*, 373 U.S. at 87 (“We now hold that the suppression by the prosecution of evidence favorable to an accused upon request violates due process where the evidence is material either to guilt or to punishment, irrespective of the good faith or bad faith of the prosecution.”).

7. For discussions of cognitive bias research applied to prosecutorial *Brady* decision making, see e.g., Hadar Aviram, *Legally Blind: Hyperadversarialism, Brady Violations and the Prosecutorial Organizational Culture*, 87 ST. JOHN'S L. REV. 1 (2013); Susan Bandes, *Loyalty to One's Convictions: The Prosecutor and Tunnel Vision*, 49 HOW. L.J. 475 (2006); Alafair S. Burke, *Improving Prosecutorial Decision Making: Some Lessons of Cognitive Science*, 47 WM. & MARY L. REV. 1587, 1593 (2006) (exploring four specific types of cognitive bias) [hereinafter Burke, *Improving*]; Alafair Burke, *Neutralizing Cognitive Bias: An Invitation to Prosecutors*, 2 N.Y.U. J.L. & LIBERTY 512 (2007) [hereinafter Burke, *Neutralizing*]; Keith A. Findley & Michael S. Scott, *The Multiple Dimensions of Tunnel Vision in Criminal Cases*, 2006 WIS. L. REV. 291, 307–22 (2006); Ellen Yaroshfsky, *Why Do Brady Violations Happen: Cognitive Bias and Beyond*, THE CHAMPION, May 2013, at 12. Cognitive bias is, of course, not the sole explanation available or offered by scholars to explain *Brady* error. See e.g., *id.*

8. For a thoughtful analysis of a host of cognitive bias studies and their potential application to the prosecutorial context, see Burke, *Improving*, *supra* note 7 and Findley & Scott, *supra* note 7. See generally, e.g., Craig A. Anderson, *Inoculation and Counterexplanation: Debiasing Techniques in the Perseverance of Social Theories*, 1 SOC. COGNITION 126 (1982).

9. The Benson & Manoogian III Wikipedia *Cognitive Bias Codex* gives a sense of the variety of identified types of such bias. Buster Benson & John Manoogian III, *Cognitive Bias Codex*, <https://upload.wikimedia.org/>

implicitly or both. Researchers often categorize explicit bias as attitudes of which the individual has self-awareness, and which are commonly measured by self-reporting.¹⁰ In contrast, although definitions vary somewhat, scholars describe implicit bias as involving “evaluations that are automatically activated by the mere presence (actual or symbolic) of the attitude object and commonly function without a person’s full awareness or control.”¹¹ Scholars explain that “[i]mplicit biases may well be dissociated from what we actively and honestly believe.”¹² Both explicit and implicit bias may operate in prosecutorial failure-to-disclose contexts.

Confirmation bias is one example of these types of mental processes.¹³ Under the influence of confirmation bias, an individual, generally without conscious awareness, selects and interprets evidence in a manner that supports the individual’s pre-existing viewpoint and undervalues or rejects evidence contrary to this pre-existing perspective.¹⁴ Confirmation bias can cause prosecutors to miss the exculpatory quality of evidence or to discount its value, which can lead to failure to disclose.¹⁵

wikipedia/commons/a/a4/The_Cognitive_Bias_Codex_-_180%2B_biases%2C_designed_by_John_Manoogian_III_%28jm3%29.png [https://perma.cc/5VFX-MQNT].

10. See, e.g., John F. Dovidio, Kerry Kawakami & Samuel L. Gaertner, *Explicit and Implicit Prejudice and Interracial Interaction*, 82 J. PERSONALITY & SOC. PSYCHOL. 62 (2002).

11. *Id.* at 62 (citing Anthony G. Greenwald & Mahzarin R. Banaji, *Implicit Social Cognition: Attitudes, Self-Esteem, and Stereotypes*, 102 PSYCHOL. REV. 4 (1995)). Other scholars explain that “[e]xplicit bias is a preference deliberately generated and consciously experienced as one’s own; implicit bias is an association or preference that is not consciously generated and is experienced without awareness.” Bernice B. Donald & Sarah E. Redfield, *Framing the Discussion*, in ENHANCING JUSTICE: REDUCING BIAS 14 (Sarah E. Redfield ed., 2017) (citing JERRY KANG, NAT’L CTR. FOR STATE COURTS, IMPLICIT BIAS: A PRIMER FOR COURTS 1 (2009), <http://wp.jerrykang.net.s110363.gridserver.com/wp-content/uploads/2010/10/kang-Implicit-Bias-Primer-for-courts-09.pdf> [https://perma.cc/SVJ6-SD54]); David Faigman, Jerry Kang, Mark Bennett, Devon Carbado, Pam Casey, Nilanjana Dasgupta, Rachel Godsil, Anthony Greenwald, Justin Levinson & Jennifer Mnookin, *Implicit Bias in the Courtroom*, 59 UCLA L. REV. 1124, 1129 (2012) (“[Implicit biases] can function automatically, including in ways that the person would not endorse as appropriate if he or she did have conscious awareness.”). For analyses of research on and the implications of explicit and implicit bias and its manifestations in the judicial system, among other venues, see ENHANCING JUSTICE: REDUCING BIAS 5 (Sarah E. Redfield ed., 2017).

12. Donald & Redfield, *supra* note 11, at 14 (endnote omitted).

13. Raymond S. Nickerson, *Confirmation Bias: A Ubiquitous Phenomenon in Many Guises*, 2 REV. GEN. PSYCHOL. 175, 175 (1998). More generally, “Scholars across many disciplines, from psychology to neuroscience to law, increasingly acknowledge that much of the decision-making process is ‘implicit,’ meaning outside of our conscious awareness.” Julie A. Seaman, *Winning Arguments*, 41 LAW & PSYCHOL. REV. 1, 4 (2017).

14. Nickerson, *supra* note 13, at 175 (“It refers usually to unwitting selectivity in the acquisition and use of evidence. The line between deliberate selectivity in the use of evidence and unwitting molding of facts to fit hypotheses or beliefs is a difficult one to draw in practice, but the distinction is meaningful conceptually, and confirmation bias has more to do with the latter than with the former.”). On cognitive bias and motivated reasoning in criminal investigations and related contexts, see, e.g., DAN SIMON, IN DOUBT: THE PSYCHOLOGY OF THE CRIMINAL JUSTICE PROCESS (2012).

15. See, e.g., Burke, *Improving*, *supra* note 7, at 1603–04. For an engaging visual that offers a perspective on categorizing types of cognitive biases, see Benson & Manoogian, *supra* note 9.

In the context of *Brady* error, one might be inclined to associate the concept of explicit bias with intentional failure to disclose and implicit bias with inadvertent failure to disclose. However, the concepts of explicit and implicit bias are distinct from intentional and inadvertent failures to disclose. For example, implicit bias may contribute to a prosecutor's decision to intentionally withhold evidence the prosecutor knows is favorable to the defense.¹⁶

Finding effective approaches for disrupting cognitive biases that impede appropriate evaluation of and disclosure of evidence favorable to the defense, whether those biases manifest in explicit or implicit forms, may be key to preventing *Brady* constitutional violations. Cognitive science research suggests that perspective taking, "the process of imagining the world from another person's perspective,"¹⁷ can modify one's perspective to reduce explicit and implicit cognitive bias and change behavior.¹⁸ Advances in such research demonstrate that perspective taking in virtual reality can be far more potent than traditional perspective taking.¹⁹ In this medium, walking in the shoes of another is not a

16. For research on the relationship between implicit and explicit processes, see, e.g., Irene V. Blair, Jennifer E. Ma & Alison P. Lenton, *Imagining Stereotypes Away: The Moderation of Implicit Stereotypes Through Mental Imagery*, 81 J. PERSONALITY & SOC. PSYCHOL. 828, 837 (2001) (reporting that "[f]ive experiments provided compelling evidence for the moderating influence of mental imagery on implicit stereotypes" and arguing that "implicit and explicit processes may be more interdependent than previously believed" and that "[n]ot only can implicit stereotypes influence explicit judgments and behavior, but explicit thoughts and strategies may also influence implicit stereotypes"). For further discussion of the role implicit bias could play in intentional nondisclosure of exculpatory evidence, see *infra* note 108 and accompanying text.

17. Soo Youn Oh, Jeremy Bailenson, Erika Weisz & Jamil Zaki, *Virtually Old: Embodied Perspective Taking and the Reduction of Ageism Under Threat*, 60 COMPUTERS HUM. BEHAV. 398, 399 (2016).

18. See, e.g., *id.* On the use of avatars to reduce cognitive bias generally and with respect to explicit bias toward elderly persons, see, e.g., Nick Yee & Jeremy Bailenson, *Walk a Mile in Digital Shoes: The Impact of Embodied Perspective-Taking on Reduction of Negative Stereotyping in Immersive Virtual Environments*, Proceedings of PRESENCE 2006: The 9th Annual International Workshop on Presence (Aug. 24–26, 2006), [http://www.nickyee.com/pubs/Yee%20%20Bailenson%20-%20Digital%20Shoes%20\(2006\).pdf](http://www.nickyee.com/pubs/Yee%20%20Bailenson%20-%20Digital%20Shoes%20(2006).pdf) [<https://perma.cc/5M6S-XS39>]. On the use of avatars to reduce implicit cognitive bias based on race, see, e.g., Domna Banakou, Parasuram D. Hanumanthu, & Mel Slater, *Virtual Embodiment of White People in a Black Virtual Body Leads to a Sustained Reduction in their Implicit Racial Bias*, 10 FRONTIERS HUM. NEUROSCIENCE 1 (2016). *But see, e.g.,* VICTORIA GROOM, JEREMY N. BAIENSON & CLIFFORD NASS, *THE INFLUENCE OF RACIAL EMBODIMENT ON RACIAL BIAS IN IMMERSIVE VIRTUAL ENVIRONMENTS 1* (Psychol. Press 2009), <https://vhil.stanford.edu/mm/2009/groom-racial-embodiment.pdf> [<https://perma.cc/W8BD-ZMCZ>] (finding indicia of no decrease in bias). On the use of avatars to affect attitudes toward individuals who are homeless, see Fernanda Herrera, Jeremy Bailenson, Erika Weisz, Elise Ogle & Jamil Zaki, *Building Long-Term Empathy: A Large-Scale Comparison of Traditional and Virtual Reality Perspective-Taking*, 13 PLoS ONE 1 (2018). For a discussion of the potential of virtual reality for social neuroscience research, see, e.g., Thomas D. Parsons, Andrea Gaggioli & Giuseppe Riva, *Virtual Reality for Research in Social Neuroscience*, 7 BRAIN SCI. 42 (2017).

19. See, e.g., Tabitha C. Peck, Sofia Seinfeld, Salvatore M. Aglioti, & Mel Slater, *Putting Yourself in the Skin of a Black Avatar Reduces Implicit Racial Bias*, 22 CONSCIOUSNESS & COGNITION 779 (2013) (study finding greater reduction in racial bias with immersive embodied condition than with traditional mental simulation perspective taking); Sun Joo (Grace) Ahn, Amanda Minh Tran Le & Jeremy Bailenson, *The Effect of Embodied Experiences on Self-Other Merging, Attitude, and Helping Behavior*, 16 MEDIA PSYCHOL. 7 (2013) (third experiment finding twice the amount of helping behavior with immersive embodied condition than with traditional mental simulation perspective taking).

metaphorical exercise.²⁰ When the immersive embodied virtual experience is properly designed and produces a genuine sense of presence,²¹ the human brain takes just moments to interpret the virtual world as real and for your avatar²² to effectively become you.²³ In this virtual reality, you are not imagining the world through another’s eyes; you are looking at the world through those eyes.²⁴ Professor Jeremy Bailenson, a pioneer in the field of virtual reality (VR) research, contends that “VR is far more psychologically powerful than any medium ever invented.”²⁵ This Article explores whether the innovative power of digital avatars might be harnessed to enable prosecutors to more effectively perceive and appreciate the exculpatory nature of evidence and to be more inclined to disclose that evidence. If the power of immersive virtual environments (IVEs) can be harnessed for that purpose, avatars may reinforce or re-introduce prosecutorial self-regulation as a first line of defense against *Brady* violations.²⁶

Part I of this Article chronicles the dictates of *Brady* and its progeny.²⁷ Part II details current thinking on essential causes of *Brady* error. Part III focuses specifically on cognitive bias and identifies a range of approaches that scholars have suggested for reducing error that may be linked to cognitive bias. Part IV describes embodied perspective taking and reviews scientific research on this type of virtual reality. Part V explains how such virtual experiences might be applied to prevent *Brady* violations. Part VI investigates both potential benefits

20. See JEREMY BAIENSON, EXPERIENCE ON DEMAND: WHAT VIRTUAL REALITY IS, HOW IT WORKS, AND WHAT IT CAN DO, 76–107 (2018).

21. This phenomenon is known as psychological presence. BAIENSON, *supra* note 20, at 19 (“[Y]our motor and perceptual systems interact with the virtual world in a manner similar to how they do in the physical world . . . Presence is the sine qua non of VR.”).

22. James K. Scarborough & Jeremy N. Bailenson, *Avatar Psychology*, in THE OXFORD HANDBOOK OF VIRTUALITY 129, 130 (Mark Grimshaw ed., 2014) (“Graphical forms of online representation have become known as *avatars*. Avatars can range from very simple images . . . to complex animated 3D forms frequently *anthropomorphized*, that is, made to appear roughly human.”).

23. For discussions of the “rubber hand illusion” studies that demonstrate “how to induce body transfer into avatars” and use of a virtual mirror to create that transfer, see BAIENSON, *supra* note 20, at 84–92. To induce transfer using the virtual mirror in which participants see and experience themselves as their avatar, researchers, for example, “ask[] each subject to walk up to this virtual mirror, spend about 90 seconds gesturing in front of the mirror, and closely observ[ing] her ‘reflection’ as it move[s] with her.” *Id.* at 85. Similarly, in a study on ageism using the virtual mirror, “participants were told, ‘For the next minute, look closely at your reflection in the mirror. This is what you look like to others in the virtual world. Imagine a day in the life of this individual, looking at the world through her/his eyes and walking through the world in her/his shoes.’” Oh et al., *supra* note 17, at 401–02.

24. GROOM ET AL., *supra* note 18, at 14.

25. BAIENSON, *supra* note 20, at 6.

26. Recent research on avatars and reducing bias in criminal justice procedures focuses on the question of using avatars to reduce racial bias. See Natalie Salmanowitz, *Unconventional Methods for a Traditional Setting: The Use of Virtual Reality to Reduce Implicit Racial Bias in the Courtroom*, 15 U.N.H. L. REV. 117 (2016) [hereinafter Salmanowitz, *Unconventional Methods*]; Natalie Salmanowitz, *The Impact of Virtual Reality on Implicit Racial Bias and Mock Legal Decisions*, 5 J.L. & BIOSCIENCES 174 (2018) [hereinafter Salmanowitz, *Impact of Virtual Reality*].

27. There is a rich scholarly literature on *Brady* error. The *Brady*-related articles cited in note 7, *supra*, and that are cited in the remaining footnotes in this Article represent a subset of that literature.

and drawbacks of the proposed approach. The conclusion suggests next steps for testing the proposal.

I. OVERVIEW OF *BRADY V. MARYLAND*

In *Brady*, the prosecution declined to disclose to the defense a co-perpetrator's confession in which the co-perpetrator admitted that he, rather than the defendant, had been the actual killer in a robbery murder.²⁸ The defense had requested access to all of the statements by the co-perpetrator and had been made privy to other statements, but the prosecution had withheld this statement containing the confession.²⁹ The U.S. Supreme Court concluded "that the suppression by the prosecution of evidence favorable to an accused upon request violates due process where the evidence is material either to guilt or to punishment, irrespective of the good faith or bad faith of the prosecution."³⁰

Five defining features of *Brady* emerge as critical to the analysis here. First, inculpatory evidence is not subject to *Brady* disclosure; the evidence has to be "favorable to an accused."³¹ As a result, in order for a prosecutor to recognize that the evidence is subject to *Brady*, the prosecutor must comprehend its favorable nature. Second, whether or not the prosecution recognizes the favorable nature of the evidence, if the evidence is later deemed material and exculpatory by a court or other reviewing authority, the prosecutor is liable for *Brady* error.³² Thus, whether the road to non-disclosure is paved with good or bad intentions, sanctions can accompany the failure to disclose.³³ Third, generally, in order to be able to comply with *Brady*, in a practical sense, the prosecution must be aware of

28. *Brady v. Maryland*, 373 U.S. 83, 84 (1963).

29. *Id.*

30. *Id.* at 87; see also *United States v. Agurs*, 427 U.S. 97, 110 (1976) ("Nor do we believe the constitutional obligation is measured by the moral culpability, or the willfulness, of the prosecutor. If evidence highly probative of innocence is in his file, he should be presumed to recognize its significance even if he has actually overlooked it." (footnote omitted)). The Supreme Court's choice not to distinguish between deliberate violations of *Brady* motivated by bad faith and inadvertent non-disclosure despite good faith diligence and to categorize all *Brady* error as prosecutorial misconduct is sometimes perceived as problematic from a policy standpoint. Cf. *Coleman & Lockett*, *supra* note 5, at 207.

31. *Brady*, 373 U.S. at 87. Although "favorable to an accused" may be understood as a broader category, for the purposes of this paper, "exculpatory" and "favorable to an accused" are used interchangeably by the author with the intent to connote the broader rubric. Cited sources, however, may still distinguish the terms.

32. Pursuant to *Kyles v. Whitley*, 514 U.S. 419, 437–38 (1995), the prosecution is responsible for evidence that was collected by or came into the possession of a member of the prosecutorial team, which generally extends to the law enforcement agencies involved in the case.

33. Scholars also argue that specific sanctions against a prosecutor rarely accompany reversals based on *Brady* error. See, e.g., Richard A. Rosen, *Disciplinary Sanctions Against Prosecutors for Brady Violations: A Paper Tiger*, 65 N.C. L. REV. 693 (1987); Barry Scheck, *Professional and Conviction Integrity Programs: Why We Need Them, Why They Will Work, and Models for Creating Them*, 31 CARDOZO L. REV. 2215, 2219 (2010) ("It would be naïve, if not irresponsible, to believe that the prospect of civil liability, disciplinary action, the stigma of appellate reversal, or the initiation of criminal prosecution really serve as credible deterrents to *Brady* violations.").

the evidence in question.³⁴ *Brady* concerns often arise when such evidence lies in the file of law enforcement team members on the case, but has not been transmitted to the prosecutor. Prosecutorial lack of awareness of such evidence does not exempt the prosecutor from disclosure obligations.³⁵ Fourth, evidence that relates either to the determination of guilt or to that of sentencing must be disclosed.³⁶ Fifth, although prosecutors should disclose all evidence favorable to the accused, as a constitutional requirement under *Brady*, failure to disclose that could subject the prosecutor to liability or serve as grounds for reversal involves only evidence that qualifies as “material,” meaning that “there is a reasonable probability that, had the evidence been disclosed, the result of the proceeding would have been different.”³⁷ The U.S. Supreme Court has defined reasonable probability as one that “‘undermines confidence in the outcome of the trial.’”³⁸ The materiality requirement enables courts, like the U.S. Supreme Court in the 2017 case of *Turner v. United States*,³⁹ to acknowledge that evidence is favorable to the accused but that it is “too little, too weak, or too distant from the main evidentiary points”⁴⁰ to warrant disclosure. From a constitutional standpoint, without materiality, the failure to disclose is not considered prejudicial to the defense.⁴¹ This materiality requirement can provide a buffer to avoid post-trial findings of reversible error. Because prosecutorial conduct is judged retrospectively using this standard, it may also cause prosecutors to prospectively underweight the exculpatory nature of the evidence based on an assessment that failure to disclose it would not undermine confidence in the subsequent trial outcome.⁴²

Since *Brady*, the U.S. Supreme Court has clarified that the disclosure requirement applies not only to the prosecutor’s case in chief, but also to impeachment evidence.⁴³ The Court has also nullified the requirement that the defense make a specific request for exculpatory evidence.⁴⁴ Moreover, as noted above, the

34. Although prosecutors are liable for failure to disclose material exculpatory evidence in the possession of the full law enforcement team on the case, unless the prosecution is at least aware of the items, disclosure, absent perhaps an open-file approach, is unlikely.

35. See *Kyles*, 514 U.S. at 437–38.

36. *Brady*, 373 U.S. at 87.

37. This is the materiality standard as articulated in the U.S. Supreme Court’s recent decision in *Turner v. United States*, 137 S. Ct. 1885, 1893 (2017) (citations omitted). It found voice earlier in the decision in *Kyles*, 514 U.S. at 434.

38. *Kyles*, 514 U.S. at 434 (citations omitted).

39. *Turner v. United States*, 137 S. Ct. 1885 (2017).

40. *Id.* at 1894.

41. The Court has also clarified that, if error is found under the *Brady* line of cases, there is no need for a subsequent harmless error review. *Kyles*, 514 U.S. at 435 (“[O]nce a reviewing court applying *Bagley* [*v. United States*, 473 U.S. 667 (1985)] has found constitutional error there is no need for further harmless-error review.” (citations omitted)). If the undisclosed evidence was material, then failure to disclose was prejudicial.

42. This is a prospective evaluation about a trial that has not yet taken place. The prospective application of the retrospective materiality standard is one of the challenges of the *Brady* approach.

43. *United States v. Bagley*, 473 U.S. 667, 676 (1985).

44. *Kyles*, 514 U.S. at 433–34 (“*Bagley* held that regardless of request, favorable evidence is material, and constitutional error results from its suppression by the government, ‘if there is a reasonable probability that,

prosecution is responsible for disclosing evidence favorable to the accused that is known to those acting on behalf of the government in the case, including such evidence in the possession of the law enforcement agencies with which the prosecution works.⁴⁵ The Court has, however, explicitly noted that the Constitution does not require prosecutors to open their files generally to the defense.⁴⁶ Subject to a few exceptions, because defense counsel are not required to disclose their theory of the case or witnesses to the prosecution,⁴⁷ complying with *Brady* often involves hypothesizing about what evidence might be favorable to the defense. This can involve some mental gymnastics for a prosecutor imagining the defense perspective on the case. As a result, the Court has cautioned prosecutors to err on the side of disclosure.⁴⁸

The frequency with which *Brady* error occurs is difficult to measure, but concerns that it is widespread populate discourse on the issue. Recent commentary in the Ninth Circuit illustrates these concerns.⁴⁹ In a 2013 dissent to a denial of a petition for rehearing en banc, five Ninth Circuit judges signed onto a dissent that lamented: “There is an epidemic of *Brady* violations abroad in the land.”⁵⁰ To support this, the judges cited no fewer than twenty-nine published cases involving *Brady* error since 2000.⁵¹ This citation list does not, of course, include the many cases that never reach the appellate level or the annals of case reporters, or more generally where the *Brady* error goes undetected.

Brady functions as a constitutional floor below which a prosecutor may not descend. It does not represent a ceiling. Thus, beyond *Brady* itself, state ethics rules that are based on the ABA *Model Rules of Professional Conduct* commonly

had the evidence been disclosed to the defense, the result of the proceeding would have been different.” (quoting *Bagley*, 473 U. S. at 682)).

45. *Id.* at 437 (“[T]he individual prosecutor has a duty to learn of any favorable evidence known to the others acting on the government’s behalf in the case, including the police.”).

46. *Id.* (“We have never held that the Constitution demands an open file policy (however such a policy might work out in practice) . . .”).

47. For examples of such exceptions, see *Williams v. Florida*, 399 U.S. 78 (1970) (upholding Florida’s notice of alibi rule requiring the defense to disclose information related to a prospective alibi defense to the prosecution prior to trial); *Izazaga v. Superior Court*, 54 Cal. 3d 356 (1991) (upholding California discovery statute requiring limited discovery disclosures to the prosecution by the defense as part of reciprocal discovery law).

48. See *United States v. Agurs*, 427 U.S. 97, 108 (1986) (“[T]he prudent prosecutor will resolve doubtful questions in favor of disclosure.”).

49. See *United States v. Olsen*, 737 F.3d 625–26, 630 (9th Cir. 2013) (Kozinski, C.J., dissenting from denial of petition for rehearing en banc).

50. *Id.* The judges went on to indicate that “[o]nly judges can put a stop to it.” *Id.*

51. The dissent to the petition states that “*Brady* violations have reached epidemic proportions in recent years, and the federal and state reporters bear testament to this unsettling trend.” *Id.* at 631. For the list of the twenty-nine cases cited by the dissent, see *supra* note 5. For a critique of the assertion that there is an epidemic of *Brady* violations, including a notation that one of the twenty-nine cases was overturned on appeal, see Coleman & Lockey, *supra* note 5.

eliminate the materiality requirement.⁵² Instead, in often roughly comparable language, they demand that “[t]he prosecutor in a criminal case shall . . . make timely disclosure to the defense of all evidence or information known to the prosecutor that tends to negate the guilt of the accused or mitigates the offense”⁵³ For the purposes of state bar ethics, these jurisdictions eliminate the materiality requirement. Even without a materiality buffer, prosecutors still generally need to be aware of the existence of the evidence and comprehend its favorable nature to the defense in order to recognize that it must be disclosed under the rule, although the elimination of the materiality buffer should have a positive effect on encouraging disclosure of evidence that prosecutors under *Brady* would have recognized as favorable to the accused but not material.

II. UNDERSTANDING *BRADY* ERROR

There is limited empirical data specifically pinpointing the causes of *Brady* error.⁵⁴ From what data exists, as augmented by experience, educated surmises,

52. See, e.g., FLA. BAR RULES OF PROF'L CONDUCT R. 4-3.8 (c) (2018). The relevant Florida Rule of Professional Conduct provides in part:

The prosecutor in a criminal case shall . . . (c) make timely disclosure to the defense of all evidence or information known to the prosecutor that tends to negate the guilt of the accused or mitigates the offense, and, in connection with sentencing, disclose to the defense and to the tribunal all unprivileged mitigating information known to the prosecutor, except when the prosecutor is relieved of this responsibility by a protective order of the tribunal.

FLA. BAR RULES OF PROF'L CONDUCT R. 4-3.8 (c) (2018).

The comparable section of the California rule, whose effective date is November 1, 2018, explicitly enumerates the mental state involved as knows or reasonably should know. It reads:

The prosecutor in a criminal case shall: . . . (d) make timely disclosure to the defense of all evidence or information known to the prosecutor that the prosecutor knows or reasonably should know tends to negate the guilt of the accused, mitigate the offense, or mitigate the sentence, except when the prosecutor is relieved of this responsibility by a protective order of the tribunal[.]

CAL. RULES OF PROF'L CONDUCT R. 3.8 (asterisks omitted), http://www.calbar.ca.gov/Portals/0/documents/rules/Rule_3.8-Exec_Summary-Redline.pdf [<https://perma.cc/DH3R-YTS6>]; see also MODEL RULES OF PROF'L CONDUCT R. 3.8 (2018) [hereinafter MODEL RULES].

53. FLA. BAR RULES OF PROF'L CONDUCT R. 4-3.8 (c) (2018); MODEL RULES R. 3.8. Section (d) of the ABA *Model Rules* Rule 3.8 also requires disclosure with respect to sentencing as follows: “The prosecutor in a criminal case shall . . . in connection with sentencing, disclose to the defense and to the tribunal all unprivileged mitigating information known to the prosecutor, except when the prosecutor is relieved of this responsibility by a protective order of the tribunal[.]” MODEL RULES R. 3.8.

54. Scheck, *supra* note 33, at 2216 (“Recognizing there is little empirical data on the causes of *Brady* violations”); Faigman et al., *supra* note 11, at 1141 (“[W]e have no studies, as of yet, that look at prosecutors’ and defense attorneys’ implicit biases and attempt to correlate them with those individuals’ charging practices or plea bargains. Nor do we know as much as we would like about their implicit biases more generally.”); Yaroshfsky, *supra* note 7 (“It is difficult to conduct studies of prosecutors’ decision making, and any conclusions necessarily reflect the inherent bias of results based upon self-reporting.”). Some empirical and/or statistical research about *Brady* prosecutorial tasks and decision making does exist; a subset of which relates specifically to cognitive bias. See, e.g., JAMES S. LIEBMAN ET AL., A BROKEN SYSTEM, PART II: WHY THERE IS SO MUCH ERROR IN CAPITAL CASES, AND WHAT CAN BE DONE ABOUT IT 411–12 (2002), <http://www2.law.columbia.edu/brokensystem2> [<https://perma.cc/TL93-7Y9B>]; Barbara O’Brien, *A Recipe for Bias: An*

and research in cognitive psychology,⁵⁵ scholars and jurists posit a number of likely explanations. Professor Barry Scheck, a founder of the Innocence Project, proposes three overarching categories through which more specific explanations can be explored.⁵⁶ This Article uses a variation of those three categories as follows: 1) the prosecutor was not aware the evidence existed, but law enforcement was aware of the evidence; 2) the prosecutor was aware the evidence existed but did not recognize its favorable material nature; and 3) the prosecutor was aware the evidence existed and recognized or at least “strongly suspected”⁵⁷ its *Brady* nature but intentionally withheld it.⁵⁸

Empirical Look at the Interplay Between Institutional Incentives and Bounded Rationality in Prosecutorial Decision Making, 74 MO. L. REV. 999 (2009); Yaroshefsky, *supra* note 7.

55. See *infra* notes 60–114 and accompanying text.

56. Scheck, *supra* note 33, at 2216. In a “thought experiment” on the subject, Professor Scheck captures three of these salient and overarching explanations as follows:

- (1) The *Brady* material was not in the prosecutor’s file because the police did not provide it in written form to the prosecutor working on the case;
- (2) The *Brady* material was in the prosecution’s file, or known to the prosecutor from an oral communication, but the prosecution did not identify it as *Brady* and, therefore, did not turn it over to the defense; and
- (3) The prosecutor did not turn over to the defense information that he or she knew or strongly suspected could be *Brady* material out of fear.

Id. at 2227.

57. *Id.*

58. *Id.* Applying the framework in the text above to the underlying facts in *Connick v. Thompson*, 563 U.S. 51 (2011), merits consideration of three types of evidence that prosecutors did not disclose. The first was the laboratory report on blood taken from a swatch of material “stained by the robber’s blood” in the robbery prosecution as well as the swatch itself. *Connick v. Thompson*, 563 U.S. 51, 84 (2011) (Ginsburg, J., dissenting). The report indicated that the blood type involved was type B. *Id.* at 81 (Ginsburg, J., dissenting). According to the Supreme Court opinion, the prosecution did not know Mr. Thompson’s blood type, which, in fact, was type O. *Id.* at 55–56. “His prosecutors failed to disclose the existence of the swatch or the test results.” *Id.* at 81 (Ginsburg, J. dissenting). Nor, according to Justice Ginsburg’s dissent, did the defense have a reasonable opportunity to access the swatch for inspection or testing before trial. *Id.* at 83–85 (Ginsburg, J., dissenting). Then, prosecutor “Deegan checked the swatch out of the property room on the morning of the first day of trial, but the prosecution did not produce the swatch at trial. . . . Deegan did not return the swatch to the property room after trial, and the swatch has never been found.” *Id.* at 85. Nine years after Mr. Thompson’s convictions for robbery and murder, Deegan, then terminally ill, confessed to a friend and former prosecutor from that same office ““that he [Deegan] had intentionally suppressed blood evidence in the armed robbery trial of John Thompson.”” *Id.* at 87–88 (Ginsburg, J., dissenting) (citing Record EX583). (It was to prosecutor Deegan’s confession that the first paragraph of this Article refers.) Because the prosecution did not actually know that Thompson’s blood type did not match the one on the swatch, some may argue that the lab report and swatch fall into category two, meaning the prosecution knew of the evidence but did not recognize its exculpatory nature. Deegan’s confession, however, may suggest that there was an awareness of the need to disclose the report as potential *Brady* material, which would place the *Thompson* case in category three with respect to the lab report and swatch. If readers view the laboratory report on the blood type of the swatch as equivocal in terms of category placement, other evidence withheld by the prosecution was arguably less equivocal. Prosecutors also failed to disclose police reports documenting an eyewitness’ initial description of the perpetrator, a description that can be understood as substantially inconsistent with Mr. Thompson’s appearance at the time. *Id.* at 85–87. In addition, the prosecutor failed to disclose

A. CATEGORY ONE: PROSECUTORIAL LACK OF AWARENESS OF EVIDENCE
IN THE POSSESSION OF LAW ENFORCEMENT⁵⁹

A myriad of specific potential explanations appears within each of these three categories. For example, the press of high caseloads for police can result in evidence, both exculpatory and inculpatory, not being documented or sent to the prosecutor's office at all. This produces category one error, where law enforcement is aware of the existence of the evidence, but the prosecutor is not. Similarly, "[p]rosecutors could literally miss the evidence, such as a police or laboratory report buried among many documents, due to crushing caseloads and not having enough time to review their file as carefully as they would like."⁶⁰ A series of interviews with thirty-five current and former prosecutors in seven offices conducted in 2010 by Professor Ellen Yaroshefsky and her team revealed the press of work as one important reason prosecutors fail to disclose.⁶¹ She explained that "[h]igh caseloads and under-funding, notably in large urban jurisdictions, create an environment with insufficient documentation of witness statements, failure to follow up on police evidence, and lack of attention to items of evidentiary value."⁶²

Remedies for addressing errors caused by underfunding and inadequate resources can focus, at least in part, directly on injections of appropriate resources at critical junctures in the *Brady* evaluation process. Scholars' recommendations for these and other structural bases for *Brady* error include processes to more easily document witness statements, protocols for circling back to police regarding evidence in their possession, supplemental reviews by the line prosecutor or supervisors of evidence in cases, and monitoring and cross-checking systems to review the success of evidence evaluation.⁶³

audiotapes intimating that a key witness was expecting to receive the \$15,000 reward that the family of the victim had offered. *Id.* Instead, that witness:

testified that he volunteered information to the police with no knowledge of reward money. . . . Because prosecutors had not produced the audiotapes of [that witness'] conversations with the [victim's] family (or a police summary of the tapes), Thompson's attorneys could do little to cast doubt on [that witness'] credibility. In closing argument, the prosecution emphasized that Thompson presented no "direct evidence" that reward money had motivated any of the witnesses.

Id. at 86. With respect to the latter two types of evidence, the eyewitness description and the potential reward, as described in Justice Ginsburg's dissent, presumably they should place the *Thompson* case within category three.

59. For purposes of this analysis, the law enforcement awareness could either be awareness of the existence of the evidence or it could encompass both awareness of the existence and awareness of the likely *Brady* nature of the evidence.

60. Scheck, *supra* note 33, at 2233. Under Professor Scheck's definitions, which differ somewhat from those in this Article, being unaware of evidence that is contained in a prosecution file would fall under category two. Because of the modified definition of category one in this Article, here, it would fall under category one.

61. Yaroshefsky, *supra* note 7.

62. *Id.* These explanations also may result from cognitive bias, which is the heading that Professor Yaroshefsky employs for them in her scholarship. *Id.* But some of them might be effectively addressed, at least in part, by additional resources.

63. See, e.g., Burke, *Neutralizing*, *supra* note 7, at 520–29; Scheck, *supra* note 33, at 2238–56.

B. CATEGORY TWO: PROSECUTORIAL AWARENESS OF EVIDENCE BUT FAILURE TO RECOGNIZE *BRADY* NATURE

In the second category, the prosecutor is aware of the evidence but fails to appreciate its material favorable nature. Here, a prosecutor could misunderstand the *Brady* standard itself. With respect to the causes of *Brady* error, an extensive empirical and statistical analysis on factors contributing to various types of error in capital cases suggests that “[o]ne reason official suppression of important evidence is common before trial . . . is that the legal rule stating when police and prosecutors must turn over evidence is ambiguous and difficult to apply.”⁶⁴ The authors of this investigation of errors in capital cases explain that their

analyses reveal that it is in close cases—those in which a small amount of evidence might tip the outcome in a different direction—that the risk of serious error is the greatest. And yet under existing rules, it is in just those cases that officials are especially likely to conclude that disclosure of the seemingly small amounts of exculpatory evidence in their files is not required because the officials do not believe (as existing rules require before disclosure is mandatory) that the evidence would probably change the outcome of trial.⁶⁵

Similarly, due to a misunderstanding about the scope of the *Brady* rule, a prosecutor might believe, for example, that *Brady* did not apply to the type of evidence involved, e.g., video of an exam in an alleged sexual abuse case taken by hospital personnel of an in-hospital procedure conducted by medical personnel and not turned over to law enforcement.⁶⁶ Suggested remedies for these types of category two failures include, for example, training focused on the scope of evidence to which *Brady* applies and changes to prosecutorial office culture that encourage disclosure, as well as clarification or modification of *Brady* itself.⁶⁷

C. PROSECUTORIAL AWARENESS OF EVIDENCE AND RECOGNITION OF *BRADY* NATURE

Explanations in the third category, where the prosecutor is aware of the evidence and recognizes its *Brady* qualities but declines to disclose, might include, for example, “fear that losing a case would prevent professional advancement or

64. Liebman et al., *supra* note 54, at 411.

65. *Id.* at 411–12 (footnotes omitted). Compare *id.* at 411–12 (“would probably”), with *Turner v. United States*, 137 S. Ct. 1885, 1893 (2017) (“‘reasonable probability . . . the result of the proceeding would have been different’” (citation omitted)).

66. *People v. Uribe*, 162 Cal. App. 4th 1457, 1463 (2008). This case involves *Brady* failure to disclose a “videotape of a medical examination of [the victim]—an examination commonly (and hereafter) referred to as a SART (Sexual Assault Response Team) exam.” *Id.* at 1463. The trial court had ruled that “[m]edical or psychiatric evidence in the possession of a county hospital or clinic [is] not in the possession of the ‘prosecution team’ for purposes of the *Brady* rule[.]” but the appellate court ruled that SART was part of the prosecution team. *Id.* at 1471, 1482.

67. See, e.g., Findley & Scott, *supra* note 7, at 355.

result in demotion”⁶⁸ and “[f]ear that the defense lawyer or defendant may use *Brady* material to tailor testimony or suborn perjury[.]”⁶⁹ In addition, prosecutors have safety concerns for witnesses because of disclosure obligations.⁷⁰ For instance, with respect specifically to the timing of disclosure, rather than whether disclosure would take place, Professor Yaroshefsky quotes a prosecutor from her survey as saying: ““Did he do it or not? If he did, why should I help the defense win its case by turning over information to discredit my witness before I have to? Lives of victims can hang in the balance.””⁷¹ Concerns like the three raised here might drive a prosecutor, who is aware of the evidence and its favorable nature, to delay disclosure or withhold that evidence entirely.

If preferencing professional advancement over required disclosure represents a rational cost benefit analysis, albeit a highly problematic one, scholars have proposed or analyzed a variety of approaches to encourage disclosure that might address that preference. These include naming prosecutors in appellate reversals for *Brady* error,⁷² charging prosecutors with felony conduct,⁷³ and changing office culture to uncouple promotions from prevailing at trial.⁷⁴ With respect to the concern about possible manipulation by recipients of the information, available responses may include recognizing that, while perhaps unlikely, potential manipulation is a risk inherent in the disclosure requirement, as well as strengthening enforcement mechanisms for the ethical rules related to coaching witnesses and suborning perjury.

With respect to risks to witnesses through disclosure, Professor Gerald Reamey opines that “the fear of witness intimidation or worse is not borne out by the experience in other countries.”⁷⁵ The experience elsewhere is an important

68. Scheck, *supra* note 33, at 2237.

69. *Id.* at 2236.

70. Miriam H. Baer, *Timing Brady*, 115 COLUM. L. REV. 1, 54–55 (2015).

71. Yaroshefsky, *supra* note 7.

72. See Adam Gerschowitz, *Prosecutorial Shaming: Naming Attorneys to Reduce Prosecutorial Misconduct*, 42 U.C. DAVIS L. REV. 1059 (2009).

73. Jodi Nafzger, *Leveling Felony Charges at Prosecutors for Withholding Evidence*, 66 DRAKE L. REV. 307, 335 (2018) (describing CALIFORNIA PENAL CODE § 141, which provides in part: “(c) A prosecuting attorney who intentionally and in bad faith alters, modifies, or withholds any physical matter, digital image, video recording, or relevant exculpatory material or information, knowing that it is relevant and material to the outcome of the case, with the specific intent that the physical matter, digital image, video recording, or relevant exculpatory material or information will be concealed or destroyed, or fraudulently represented as the original evidence upon a trial, proceeding, or inquiry, is guilty of a felony punishable by imprisonment pursuant to subdivision (h) of Section 1170 for 16 months, or two or three years”); Christina E. Urhausen, *California’s New Law Will Fail to Address the Larger Problem of Brady Violations*, 69 HASTINGS L.J. 1673 (2018).

74. Scheck, *supra* note 33, at 2237 (“[T]he chief prosecutor (especially an elected prosecutor) [should] establish an environment where winning trials is not the most important measure of success.”). Other solutions that scholarship suggests include taking the decision about disclosure away from the prosecutor and entrusting it to a judge. Daniel J. Capra, *Access to Exculpatory Evidence: Avoiding the Agurs Problems of Prosecutorial Discretion and Retrospective Review*, 53 FORDHAM L. REV. 391, 427 (1984). For further discussion of this approach, see *infra* text accompanying note 136.

75. Gerald S. Reamey, *The Truth Might Set You Free: How the Michael Morton Act Could Fundamentally Change Texas Criminal Discovery, or Not*, 48 TEX. TECH L. REV. 893, 896 (“In most advanced legal systems,

factor to consider, but, given other differences in cultural and criminal justice systems, perhaps not a complete response. To the extent that concerns specifically about safety drive withholding *Brady* material, better protective mechanisms for release of the information and securing protective orders might help address those concerns and still allow for appropriate disclosure.⁷⁶ At a minimum, further study of jurisdictions in the U.S. with open-file approaches to discovery in criminal cases might expand the data on whether more (and earlier) disclosure puts witnesses at greater risk.⁷⁷ Scholars' recommended remedies for addressing these category three concerns merit serious consideration as they address important potential causes of *Brady* error.

D. ALL THREE CATEGORIES: COGNITIVE BIAS DRIVEN EXPLANATIONS

The explanations above for prosecutorial failure to disclose admit to a variety of causes, including high caseloads, ineffective communication between police and prosecutors, legal ambiguity, as well as potential cognitive bias. To better understand the role that cognitive bias specifically can play, this section focuses on a range of explanations where cognitive bias may serve as a contributing or the determinative factor in *Brady* error. Such explanations may appear in each of the three categories.

the defense receives—often early in the process and without requesting it—all of the evidence collected by the police and prosecution. . . . While judges should be able to order suitable, tailored protections for witnesses and evidence in individual cases, a rule that blocks disclosure exacts a high cost from all defendants, especially in the absence of a legitimate cause for concern.” (footnotes omitted) (citing Eugene Cerruti, *Through the Looking-Glass at the Brady Doctrine: Some New Reflections on White Queens, Hobgoblins, and Due Process*, 94 KY. L.J. 211, 214–15, 253–55 (2005)).

76. See, e.g., Reamey, *supra* note 75, at 896. For an analysis of concerns about witness safety, see also Jenia Ioncheva Turner & Allison D. Redlich, *Two Models of Pre-Plea Discovery in Criminal Cases: An Empirical Comparison*, 73 WASH & LEE L. REV. 285, 310–11 (2016). Turner & Redlich note that:

[O]pponents of open-file discovery see such provisions as insufficiently protective of witness interests. As one opponent noted, they “require prosecutors and judges to gamble with witness safety by attempting to predict the unpredictable.” [(citing Sara N. Pole, Dep’t of State Police, *Minority Comments*, SUPREME COURT OF VA., REP. OF THE SPEC. COMM. ON CRIMINAL DISCOVERY RULES TO THE CHIEF JUSTICE & JUSTICES OF THE SUPREME COURT OF VA. 55 (Dec. 2, 2014))]. Opponents further note that applications for protective orders depend on prosecutors recognizing that certain information in their files might endanger a witness. But overworked and harried prosecutors may not have the time or energy to review the evidence carefully before disclosing it and may miss signs of potential threats to witnesses. Some critics of open-file have also argued that protective orders would be insufficient to ensure witness safety because:

[T]rial courts are not comfortable with ambiguous proof of threats. They balk at addressing the kinds of threats more commonly seen, such as property mysteriously destroyed, defendants’ friends simply driving by a witness’s home several times, calls from blocked or unknown numbers, and statements to witnesses using just the right kind of tone or inflection.”

Id. at 310–11 (footnotes omitted) (quoting C. David Sands III, Deputy Commonwealth’s Attorney, Cty. of Orange, Va., Comment Letter on Proposed Virginia Criminal Discovery Rules (June 30, 2015)).

77. Scholars have undertaken some research to evaluate and compare various dimensions of open-file jurisdictions. See, e.g., Turner & Redlich, *supra* note 76; Ben Grunwald, *The Fragile Promise of Open-File Discovery*, 49 CONN. L. REV. 771, 777 (2017); *infra* notes 140–162 and accompanying text.

Prosecutors are responsible for evaluating evidence and affirmatively deciding whether to formally accuse an individual of committing a crime.⁷⁸ If a prosecutor holds fast to the prescribed professional standards, that individual is only charging cases “she believes adequately encompass the accused’s criminal activity and which . . . she reasonably believes can be substantiated by admissible evidence at trial.”⁷⁹ At a minimum, ethical rules generally require that a “prosecutor in a criminal case shall . . . refrain from prosecuting a charge that the prosecutor knows is not supported by probable cause.”⁸⁰

Although subject to some debate, issuing charges can be understood as a formal statement that the prosecutor believes the evidence meets those standards and that the accused is guilty of the crime.⁸¹ At least from this time forward, a perception that the accused is guilty, what this Article will refer to as a “Guilt Perspective,”⁸² may root itself in the prosecutor’s mind and thereafter serve as the filter through which evidence is understood.⁸³ This Guilt Perspective renders the prosecutor susceptible to a variety of cognitive biases.

Scholars have posited the correlation of several types of cognitive bias as particularly relevant to the question of *Brady* error and the Guilt Perspective filter.⁸⁴ Professor Alafair Burke, for example, enumerates four of these: “confirmation bias, selective information processing, belief perseverance, and the avoidance of cognitive dissonance.”⁸⁵

For a prosecutor, once the Guilt Perspective takes hold, Professor Burke argues that “confirmation bias causes her to seek information that confirms the theory of guilt; selective information processing causes her to trust information tending to confirm the theory of guilt and distrust potentially exculpatory evidence; and

78. NAT’L PROSECUTION STANDARDS 4-2.1 (NAT’L DIST. ATTORNEYS’ ASS’N 3d ed.) (“It is the ultimate responsibility of the prosecutor’s office to determine which criminal charges should be prosecuted and against whom.”).

79. *Id.* at 4-2.2.

80. MODEL RULES. R. 3.8 (a).

81. The debate relates to whether, by charging someone with a crime, the prosecutor is conveying that the prosecutor personally believes the accused is culpable. For a discussion of views on this issue, see, e.g., Burke, *Improving*, *supra* note 7, at nn.107–08 and accompanying text.

82. See Herbert Packer, *Two Models of the Criminal Process*, 113 U. PA. L. REV. 1, 11–13 (1964) (“The presumption of guilt allows the Crime Control Model to deal efficiently with large numbers. The supposition is that the screening processes operated by police and prosecutors are reliable indicators of probable guilt. Once a man has been investigated without being found to be probably innocent, or, to put it differently, once a determination has been made that there is enough evidence of guilt so that he should be held for further action rather than released from the process, then all subsequent activity directed toward him is based on the view that he is probably guilty. The precise point at which this occurs will vary from case to case . . . The presumption of guilt . . . is basically a prediction of outcome.”).

83. See, e.g., Burke, *Improving*, *supra* note 7, at 1614 (“In the context of prosecutorial decision making, the biasing theory is the prosecutor’s belief that the defendant is guilty.”). Commentators often refer to the tendency to hold fast to a presumption of guilt as the presumption being “sticky” or resulting in “tunnel vision.” *Id.* at 1604–07; Daniel S. Medwed, *The Zeal Deal: Prosecutorial Resistance to Post-Conviction Claims of Innocence*, 84 B.U. L. REV. 125, 140 (2004).

84. See, e.g., Burke, *Improving*, *supra* note 7, at 1593–94 (footnotes omitted).

85. *Id.* at 1593–94 (footnotes omitted).

belief perseverance causes her to adhere to the theory of guilt even when the evidence initially supporting that theory is undermined.”⁸⁶ Then, efforts to quell cognitive dissonance can further discourage the prosecutor from questioning the Guilt Perspective.⁸⁷ As Professor Barbara O’Brien explains, “Substantial psychological research demonstrates that what people want to see influences what they do see.”⁸⁸

Because prosecutors themselves and prosecutorial tasks have not been the subjects of extensive cognitive bias research, scholars take a leap, albeit a logical and intuitive one, in applying the general results on cognitive bias to prosecutorial decision making.⁸⁹ Nonetheless, there exists some empirical work specifically on prosecutorial tasks and cognitive bias. Professor O’Brien, for instance, has conducted empirical work with lay participants in the context of evaluating a mock criminal case and the cognitive bias known as defensive bolstering. She describes such bolstering as occurring “when people must justify a decision to which they have already committed.”⁹⁰ Professor O’Brien studied how the criteria used to judge the evaluators of a criminal case affects the tendency for those evaluators to look for and find support for their initial impressions. She reports that “[t]he studies . . . show that expecting to be judged for how well one persuades others that a suspect is guilty could aggravate the tendency to confirm initial suspicions.”⁹¹ Because a primary role for prosecutors involves persuading the trier of fact of an accused’s guilt, the cognitive bias of defensive bolstering may influence and detract from a prosecutor’s ability to see evidence as exculpatory.

Equipped with definitions of several specific types of cognitive bias, let us return to explanations for *Brady* error and examine examples in each of the three categories for which cognitive bias could be a significant, if not the determinative, factor.

86. *Id.* at 1614 (footnote omitted). For a more detailed discussion of confirmation bias and selective information processing, see, e.g., Alafair Burke, *Commentary: Brady’s Brainteaser: The Accidental Prosecutor and Cognitive Bias*, 57 CASE W. RES. L. REV. 575, 577–80 (2007) [hereinafter Burke, *Brainteaser*].

87. O’Brien, *supra* note 54, at 1011, 1014–15. According to Leon Festinger, cognitive dissonance “centers around the idea that if a person knows various things that are not psychologically consistent with one another, he will, in a variety of ways, try to make them more consistent.” Leon Festinger, *Cognitive Dissonance*, 207 SCI. AM. 93, 93 (1962). Avoiding cognitive dissonance for a prosecutor who believes the defendant is guilty might involve, for example, unconsciously reducing the credibility the prosecutor accords to a witness whose account seems exculpatory.

88. O’Brien, *supra* note 54, at 1011 (citing Nickerson, *supra* note 13).

89. See Aviram, *supra* note 7, at 45 (“While this Article draws on rich experimental literature regarding confirmation bias and cultural cognition of prosecutors, the specific impact of these phenomena on prosecutorial fact perception, while plausible, has not been experimentally tested yet.”).

90. O’Brien, *supra* note 54, at 1004. Defensive bolstering is not related to criminal defense. It is part of the lexicon of cognitive science research.

91. *Id.* at 1036.

1. COGNITIVE BIAS AND CATEGORY ONE ERROR

In category one error, the prosecutor is not aware of the potentially exculpatory evidence. In contrast, investigating officers are aware of the existence of the evidence, although they may or may not classify it as favorable to the accused. Consequently, exploring possible cognitive bias in the category one context focuses initially on its potential effect in the investigation phase of the case.

Police officers often receive a great deal of information when conducting an investigation in a criminal case. The officers then distill that evidence into a police report. By the time an officer is writing a report (and perhaps has a suspect in custody), much like by the time a prosecutor issues charges, a presumption of guilt about the charges the police officer will recommend that the prosecutor issue may already have taken hold in the officer's mind. Information received subsequent to that arrest may then trigger cognitive biases. As a result, confirmation bias may incline the officer to fail to perceive or appreciate evidence of an equivocal or debatable *Brady* nature as exculpatory. The force of selective information processing might encourage officers to trust the original evidence that led to a belief in a suspect's guilt with respect to the proposed charges and to distrust potentially exculpatory information. Then, belief perseverance can encourage the officer to hold fast to the presumption of guilt even in the face of potentially exculpatory evidence. Similarly, in an effort to quell cognitive dissonance, the officer may discount evidence, which, to a neutral observer, is obvious *Brady* material, as necessary to transmit to the prosecutor.⁹²

A growing body of empirical research examines the effect of cognitive biases on police investigation practices.⁹³ It suggests that such biases can distort

92. Scheck, *supra* note 33, at 2229 (“[P]olice do not reduce oral statements to writing that turn out to be *Brady* material, or eventually lead to *Brady* material, because the police do not believe that such oral statements were in any way exculpatory.”).

93. See, e.g., Karl Ask, Anna Reblus & Pär Anders Granhag, *The “Elasticity” of Criminal Evidence: A Moderator of Investigator Bias*, 22 APPLIED COGNITIVE PSYCHOL. 1245, 1253 (2008) (“[T]he same piece of evidence (e.g. a witness’ identification decision) was considered less reliable when it challenged the suspicions against a known suspect than when it confirmed the suspicions.”); Karl Ask & Pär Anders Granhag, *Motivational Bias in Criminal Investigators’ Judgments of Witness Reliability*, J. APPLIED SOC. PSYCHOL., 37, 561–91 (2007) (finding support for asymmetrical skepticism in criminal investigators’ evaluation of evidence supporting or conflicting with a pre-existing hypothesis of guilt) [hereinafter Ask & Granhag, *Judgments of Witness Reliability*]; Karl Ask & Pär Anders Granhag, *Motivational Sources of Confirmation Bias in Criminal Investigations: The Need for Cognitive Closure*, 2 J. INVESTIGATIVE PSYCHOL. & OFFENDER PROFILING 43, 57–58 (2005) (while noting limitations on the support that the experiments provided for the experiment’s hypotheses, researchers indicated that “the results of the present study provided some support for the hypothesis that people are influenced by their initial hypotheses regarding a crime when processing subsequent crime-related information”); Karl Ask, Marc-André Reinhard, Tamara Marksteiner & Pär Anders Granhag, *Elasticity in Evaluations of Criminal Evidence: Exploring the Role of Cognitive Dissonance*, 16 LEGAL & CRIMINOLOGICAL PSYCHOL. 289, 301 (2011) (“[O]ur two experiments show that the experience of dissonance is related to evaluations of criminal evidence. However, the motivational mechanism involved appears to be more complex than expected.”); Steve D. Charman, Melissa Kavetski & Dana Hirn Mueller, *Cognitive Bias in the Legal System: Police Officers Evaluate Ambiguous Evidence in a Belief-Consistent Manner*, 6 J. APPLIED RES. MEMORY & COGNITION 193, 198 (2017) (reporting that “[p]olice officers’ evaluations of evidence were related to their

information processing to the detriment of suspects and fairness in an investigation.⁹⁴ For example, in a study involving law enforcement investigators as participants, researchers tested whether the investigators would give differential credence to a witness whose statement supported a pre-existing hypothesis of guilt over that given to a witness whose statement conflicted with such a hypothesis. In the parlance of the study, the researchers focused on “*asymmetrical skepticism*, which is the tendency to subject evidence that runs counter to a person’s prior belief regarding an issue to more critical examination than belief-consistent evidence.”⁹⁵ As described in the study’s case vignette, the only distinction in the two scenarios of the witness’ account involved whether the witness heard two women arguing, a statement that supported the pre-existing inference that the perpetrator of the homicide was a female, or whether the witness heard a man and a woman arguing, a statement that conflicted with the pre-existing inference of a female perpetrator.⁹⁶ The researchers report that “[t]he results clearly support the asymmetrical skepticism hypothesis. Investigators rated the belief-inconsistent (i.e., exonerating) witness as less reliable and credible, and judged [that individual’s] witnessing and recall conditions to be less favorable, compared with the belief-consistent (i.e., incriminating) witness.”⁹⁷ Such biases may work to prevent or discourage an officer from giving appropriate credence to exculpatory material and thus making a prosecutor aware of the existence of the evidence, which produces category one failures.⁹⁸

Translated into the day-to-day reality of police work, imagine that a witness reports a residential burglary. Later that evening, the officer apprehends a person

initial beliefs in a suspect’s guilt: The more likely they were to believe the suspect was guilty, the more incriminating they perceived subsequent ambiguous evidence to be”).

94. See, e.g., Karl Ask, Anna Rebelius & Pär Anders Granhag, *The “Elasticity” of Criminal Evidence: A Moderator of Investigator Bias*, 22 APPLIED COGNITIVE PSYCHOL. 1245, 1253 (2008); Ask & Granhag, *Judgments of Witness Reliability*, *supra* note 93, at 561–91; Karl Ask & Pär Anders Granhag, *Motivational Sources of Confirmation Bias in Criminal Investigations: The Need for Cognitive Closure*, 2 J. INVESTIGATIVE PSYCHOL. & OFFENDER PROFILING 43, 57–58 (2005); Karl Ask, Marc-André Reinhard, Tamara Marksteiner & Pär Anders Granhag, *Elasticity in Evaluations of Criminal Evidence: Exploring the Role of Cognitive Dissonance*, 16 LEGAL & CRIMINOLOGICAL PSYCHOL. 289, 301 (2011); Steve D. Charman, Melissa Kavetski & Dana Hirn Mueller, *Cognitive Bias in the Legal System: Police Officers Evaluate Ambiguous Evidence in a Belief-Consistent Manner*, 6 J. APPLIED RES. MEMORY & COGNITION 193, 198 (2017).

95. Ask & Granhag, *Judgments of Witness Reliability*, *supra* note 93, at 579.

96. *Id.* at 567–68.

97. *Id.* at 579. In subsequent research, scholars focused on trying to ascertain the cause of the asymmetrical skepticism. Tamara Marksteiner, Karl Ask, Marc-André Reinhard & Pär Anders Granhag, *Asymmetrical Skepticism Towards Criminal Evidence: The Role of Goal- and Belief-Consistency*, 25 APPLIED COGNITIVE PSYCHOL. 541, 545 (2011) (“[F]inding cannot be taken as unequivocal support for either the belief-consistency or the goal-consistency account, but the fact that the reliability ratings were not reversed when participants were equipped with an ‘innocent’ (as opposed to ‘guilty’) hypothesis does show that the asymmetrical-scepticism effect cannot be accounted for entirely in terms of belief-consistency.”).

98. To address these biases, a similar virtual reality approach to the one proposed for prosecutors in Part V could be considered for law enforcement training. That would, of course, require an analysis of the potential impact on police work more generally, among other factors.

generally fitting an eyewitness' description of the burglar near the scene of the crime in possession of property stolen from the residence. In the press of the investigation and arrest, the officer discounts, does not record, and subsequently forgets about a dispatch several hours later regarding a remarkably similar burglary just a block from the originally reported burglary. The officer shifts patrol beats, and the information about the subsequent burglary is never transmitted to the prosecutor.⁹⁹ Although cognitive bias is not the only available factor to explain the failure to transmit the likely *Brady* information to the prosecutor here, cognitive bias offers one powerful and plausible explanation for category one failures.

Supplementing the cognitive bias that may afflict the evidence-gathering officer, a prosecutor may decline to request materials that the police have collected subsequent to the issuance of charges.¹⁰⁰ Cognitive bias may play a role in this choice not to follow up with police investigators. In addition, or instead, even if there is follow-up, bias may affect the follow-up questions that a prosecutor does or does not ask. If you are already convinced that the defendant is guilty, that state of mind may result in generating fewer questions that encourage investigation of potential innocence. "For example, imagine results of laboratory tests from a crime lab. A prosecutor might not think to ask for the lab's corrective-action logs or the analyst's proficiency-test results,"¹⁰¹ even though both could generate important *Brady* material. Operating under a Guilt Perspective and perceiving there to be adequate evidence to meet the burden at trial, a prosecutor may decide to avoid potential cognitive dissonance by leaving the state of the evidence undisturbed. With a choice not to contact the police or the failure to ask certain follow-up questions, the prosecutor's existing perceptions also remain undisturbed, and the prosecutor may lack awareness of evidence favorable to the accused that answers to those questions might have generated.

2. COGNITIVE BIAS AND CATEGORY TWO ERROR

In the second category, where a prosecutor is aware of the existence of evidence but does not recognize its favorable nature to the defense or perhaps its materiality, the risk of cognitive bias distorting the evaluation process may be the most pronounced. Imagine a case involving a series of thefts committed by a

99. Or, imagine the case where police officers are familiar with an essential eyewitness from prior contacts, although ones that did not generate police reports, regarding alcohol ingestion. In the case under investigation, the officers are focused on the eyewitness' contribution to identifying the individual whom the officers believe was responsible for a serious crime. They assume the witness is sober and do not perform any sobriety tests. They also neglect to mention in their reports any of their prior contacts with this individual, someone whom they might characterize as a sober alcoholic. For a discussion of the analogous issue, but with respect to a prosecutor's evaluation of whether to disclose and the potential impact of cognitive bias on that evaluation, see Burke, *Brainteaser*, *supra* note 86, at 578–80.

100. Scheck, *supra* note 33, at 2228–29.

101. Carrie Leonetti, Feedback on March 16th Manuscript (on file with author). This example was kindly supplied by Carrie Leonetti in her thoughtful and thorough review of an earlier version of the manuscript.

number of co-conspirators in which it turns out that the defendant was actually in custody on several of the days on which those thefts occurred. From a defense perspective, the defendant's custody status may be the most powerful evidence of the defendant's innocence. But from a prosecutorial perspective, because the case is charged as a conspiracy, and there is substantial evidence that the defendant is a member of the conspiracy and personally committed some of the thefts, the fact that the defendant was in custody during several of the thefts may be powerful evidence of the conspiracy itself, i.e., that several people planned and implemented the series of thefts. In evaluating whether the defendant's custody record should be disclosed, a prosecutor's Guilt Perspective may activate a full cascade of cognitive biases.¹⁰²

Consider, for example, the potential effect of defensive bolstering, the cognitive bias at issue in the empirical work by Professor O'Brien discussed above.¹⁰³ She reports that, in her first study, for participants assigned a role that prosecutors play, being judged for their ability to persuade others of their conclusions, participants "interpreted ambiguous or inconsistent evidence in a way that was more consistent with the initial suspect's guilt."¹⁰⁴ Applied to the evidence above of the defendant's in-custody status during several of the thefts, one could readily imagine defensive bolstering influencing a prosecutor's evaluation of that evidence such that the prosecutor perceives it as consistent with guilt of the conspiracy charge, rather than as material exculpatory evidence requiring disclosure. Defensive bolstering is but one of a number of cognitive biases that could be at work in each instance of prosecutorial evaluation of evidence, particularly once the Guilt Perspective has taken hold, thus decreasing the likelihood that the prosecutor will perceive or appreciate the evidence as material and exculpatory.¹⁰⁵

Prosecutorial evaluations of evidence under a *Brady* standard anticipate that a prosecutor will be able to effectively imagine the case from a defense perspective.¹⁰⁶ The presence, however, of a Guilt Perspective renders this exercise in imagining a contrasting or opposite view of the case especially challenging.

3. COGNITIVE BIAS AND CATEGORY THREE ERROR

With respect to category three error, a prosecutor might realize that the evidence in question would be material and favorable to the defense, but, for example, believe so strongly in a defendant's guilt that the prosecutor deliberately

102. For a discussion of how implicit racial bias might impact a prosecutor's decision in the context of *Brady*, see Robert J. Smith & Justin D. Levinson, *The Impact of Implicit Racial Bias on the Exercise of Prosecutorial Discretion*, 36 SEATTLE L. REV. 795, 815–16 (2012).

103. See O'Brien, *supra* note 54.

104. O'Brien, *supra* note 54, at 1029.

105. For an analysis of how confirmation bias and selective information processing might affect a prosecutor's decision to disclose the fact that an eyewitness to a robbery is a chronic alcoholic, see Burke, *Brainteaser*, *supra* note 86, at 578–80.

106. See, e.g., Burke, *Brainteaser*, *supra* note 86.

declines to disclose the *Brady* evidence. Imagine this arises because the prosecutor does not trust that a jury will evaluate the evidence in the same way that the prosecutor does and will give that exculpatory evidence more weight than the prosecutor believes it deserves.¹⁰⁷ The prosecutor's steadfast belief in the defendant's guilt may stem, for example, from awareness of other evidence that is highly incriminatory but inadmissible, or it may stem, *inter alia*, from cognitive biases that prevent the prosecutor from fully appreciating the genuinely exculpatory weight of that evidence.¹⁰⁸

In recent years, hundreds of individuals convicted of serious crimes have been exonerated based on compelling forensic evidence of innocence.¹⁰⁹ In a number of those cases, even after courts had reversed the convictions, and forensic evidence supported the accused's factual innocence, prosecutors resisted acknowledging the impact of that evidence.¹¹⁰ In considering why a prosecutor would fight dismissal even when the evidence speaks so clearly of innocence, scholars have invoked the effects of cognitive bias.¹¹¹ One can readily imagine the horror, the guilt, and the cognitive dissonance that a conscientious prosecutor might feel in realizing that the prosecutor has personally caused an innocent person to be incarcerated for years for a crime the person did not commit. Insisting that the system is mistaken in its view of innocence may alleviate some of what might be traumatic cognitive dissonance for that prosecutor. As Professor Alafair Burke explains more generally: "From this perspective, prosecutorial resistance to defense claims of innocence can be viewed as deep (and inherently human) adherences to the 'sticky' presumptions of guilt that result from various forms of cognitive bias that can impede the neutrality of prosecutors throughout their handling of a case."¹¹²

107. Other explanations may also be at play. Or, if cognitive bias does not really play a role, then other techniques for addressing category three error might be implemented. For example, Professor Yaroshefsky reports from her study that "the primary influence on pretrial disclosure practices is less the law itself, but a combination of office culture and policy, and the prosecutors' own professional values." Yaroshefsky, *supra* note 7 (footnote omitted).

108. These biases may be implicit. For example, confirmation bias could undermine the prosecutor's ability to appreciate the weight or importance of that exculpatory evidence.

109. See, e.g., *Featured Cases*, THE INNOCENCE PROJECT, <https://www.innocenceproject.org/all-cases/#exonerated-by-dna> [<https://perma.cc/3LB3-7S27>].

110. See, e.g., Medwed, *supra* note 83, at 134; Burke, *Neutralizing*, *supra* note 7, at 518–19 ("In many of the recent exoneration cases, for example, prosecutors have continued to insist that the exonerated defendant is guilty, even when exculpatory DNA evidence undermines the government's initial case. This seemingly inhumane stubbornness can be viewed instead as a very human example of belief perseverance." (footnotes omitted)); see also SIMON, *supra* note 14, at 31.

111. See, e.g., Burke, *Neutralizing*, *supra* note 7, at 518–19.

112. Burke, *Neutralizing*, *supra* note 7, at 515 (footnotes omitted); see also Medwed, *supra* note 83, at 134. Some experimental laboratory research conducted with lay participants suggests that more serious crimes might encourage prosecutors to "believe[] more strongly in the defendant's guilt . . . [believe that] obtaining a conviction [is] more personally important [than in less serious offenses], and . . . [encourage] misconduct more often [than in less serious offenses]." Jeffrey W. Lucas, Corina Graif & Michael J. Lovaglia, *Misconduct in the Prosecution of Severe Crimes: Theory and Experimental Test*, 69 SOC. PSYCHOL. Q. 97, 104 (2006). If these

Individually and collectively, cognitive biases can contribute to what is commonly termed prosecutorial “tunnel vision,” an individual and environmental process that tends to focus on cementing an accused’s guilt.¹¹³ Thus, these biases can impair the prosecutor’s ability to fulfill the *Brady* requirements of evaluating the exculpatory nature of evidence and its materiality and correspondingly disclosing that evidence. Not surprisingly then, much current *Brady* scholarship now focuses on cognitive bias as an essential, albeit not the sole, explanation of *Brady* error.¹¹⁴

III. THE GUILT PERSPECTIVE, COGNITIVE BIAS, AND PROPOSED REMEDIES IN THE SCHOLARLY LITERATURE

The question then becomes: What types of interventions can mitigate cognitive bias?¹¹⁵ Scholars who focus on cognitive bias as a primary factor in *Brady* error have suggested a number of possible interventions.¹¹⁶ This section addresses six of the most salient related to that bias: 1) improving charging accuracy before the Guilt Perspective attaches; 2) professional and conviction integrity programs; 3) training on cognitive bias; 4) involving unbiased decision makers in the *Brady* evaluation; 5) open-file policies; and 6) switching roles. As the focus of this Article is on improving prosecutorial compliance with *Brady*, the constitutional lodestar and minimum threshold for required discovery of evidence favorable to

results are borne out in real practice, then the seriousness of the offense may suggest the need for increasingly proactive measures to truncate prosecutorial cognitive bias.

113. See, e.g., Findley & Scott, *supra* note 7. For a discussion of questionnaire survey data investigating the potential development of a “conviction psychology” by prosecutors, see George T. Felkenes, *The Prosecutor: A Look at Reality*, 7 SW. U. L. REV. 98 (1975).

114. Burke, *Neutralizing*, *supra* note 7, at 515 (“[T]here has been increased attention to the possibility that unintentional cognitive biases can play at least as large a role in wrongful convictions as intentional prosecutorial misconduct. A growing literature seeks to attribute poor prosecutorial decision making to a set of information-processing biases that we all share, rather than exclusively to ethical or moral lapses.”).

115. For an analysis of interventions to address implicit bias more generally, see, e.g., Calvin C. Lai, Kelly M. Hoffman & Brain A. Nosek, *Reducing Implicit Prejudice*, 7 SOC. & PERSONALITY PSYCHOL. COMPASS 315 (2013).

116. See *infra* notes 117–181 and accompanying text. As illustrated by some of the examples in the text, particularly some of those in Part II above, proposed interventions to address *Brady* error are not necessarily limited (or specific) to cognitive-bias driven explanations. See also, e.g., Kevin C. McMunigal, *Prosecutorial Disclosure Violations: Punishment vs. Treatment*, 64 MERCER L. REV. 711, 720–21 (2013) (suggesting possible use or scaling of prosecutorial mental states to determine sanctions and/or providing amnesty or immunity for prosecutorial reporting of error); KATHLEEN M. RIDOLFI & MAURICE POSSLEY, PREVENTABLE ERROR: A REPORT ON PROSECUTORIAL MISCONDUCT IN CALIFORNIA 1997–2009 (2010), <https://digitalcommons.law.scu.edu/cgi/viewcontent.cgi?article=1001&context=ncippubs> [<https://perma.cc/T7J4-ER8K>] (suggesting a range of interventions for prosecutorial misconduct generally, some directed toward attorneys and others directed toward courts, including, *inter alia*, criminal justice attorney ethics training, internal prosecutorial office disciplinary protocols and tracking and investigation of misconduct complaints, written, publicly accessible prosecutorial *Brady* compliance policies, an ethics rule change, naming attorneys in court opinions finding misconduct, and reducing prosecutorial immunity to a maximum of qualified, as opposed to absolute, immunity). The literature on *Brady* error is extensive, and scholars have proposed many approaches to remedy such error, of which this Article addresses only a subset.

the accused, the set of approaches discussed in this section does not include, *inter alia*, modifying *Brady* itself.

A. IMPROVING CHARGING ACCURACY PRIOR TO ATTACHMENT OF GUILT PERSPECTIVE

With respect to the first of these six interventions, Professor Burke argues that providing as complete a collection of evidence as possible to the prosecutor before charging might increase accuracy.¹¹⁷ She advocates that “police should record, preserve, and disclose to the prosecutor all evidence collected during their investigation, both inculpatory and exculpatory.”¹¹⁸ Correspondingly, she recommends that, in more serious cases, prosecutors themselves, as is the situation in some jurisdictions,¹¹⁹ should be actively involved in the investigation and evidence collection process.¹²⁰ Under this approach, with a more comprehensive view of the evidence before the Guilt Perspective attaches, prosecutors might be better able to gauge the appropriateness of charging and disclosing exculpatory evidence. Access to a more comprehensive view of the evidence before filing seems likely to enhance initial accuracy, which is an important benefit to justice. Moreover, increased accuracy might reduce the number of innocent individuals who get dragged into the criminal justice process.

It is not, however, apparent that these measures would decrease the prosecutor’s Guilt Perspective once charges have been filed nor necessarily have a positive impact on appropriate prosecutorial disclosure of information should additional evidence become available. Indeed, to the contrary, prosecutors who were involved in the investigation or those who feel they have had a very comprehensive view of the evidence in making the charging decision may be less likely to disengage from the Guilt Perspective once that perspective has taken hold. In addition, both requiring police to collect and make available more evidence and prosecutorial involvement in the investigation stage demand additional law enforcement and prosecutorial time and resources.

Charging also has time constraints. United States Supreme Court doctrine requires that, for individuals arrested without a warrant, a judicial determination regarding probable cause must generally be made within forty-eight hours of the arrest.¹²¹ Effectively, arrestees cannot generally be held in custody for more than forty-eight hours, excluding certain limited periods, unless charges are filed.¹²²

117. See Burke, *Improving*, *supra* note 7, at 1615.

118. *Id.* (footnote omitted).

119. See Rory K. Little, *Proportionality as an Ethical Precept for Prosecutors in Their Investigative Role*, 68 *FORDHAM L. REV.* 723, 724 (1999) (“Public prosecutors in this country have increasingly become involved in the investigative stages of criminal matters during the 20th century.”).

120. Burke, *Improving*, *supra* note 7, at 1615.

121. See *County of Riverside v. McLaughlin*, 500 U.S. 44, 56 (1991).

122. See, e.g., CAL. PENAL CODE § 825 (2004) (“(a)(1) Except as provided in paragraph (2), the defendant shall in all cases be taken before the magistrate without unnecessary delay, and, in any event, within 48 hours after his or her arrest, excluding Sundays and holidays. (2) When the 48 hours prescribed by paragraph

Consequently, while Professor Burke is undoubtedly correct that police should document and provide all available evidence to the prosecution before charging, the forty-eight hour limit may constrain the practical likelihood of achieving this goal in some cases. Thus, evaluators need to consider whether the benefit of potential increased accuracy of the initial charge outweighs the cost of increased resource expenditure of police and prosecutors, as well as the practical consequences of such a policy in light of other constraints.

To the extent that Professor Burke's recommendation of providing a more comprehensive data set to the prosecutor prior to charging is feasible, without undue expenditure of resources or delay, it should increase accuracy in the charging process and might postpone the onset of a Guilt Perspective through a critical phase of the evaluation of evidence.

B. PROFESSIONAL AND CONVICTION INTEGRITY PROGRAMS

Professor Scheck recommends tackling cognitive bias (and several other *Brady*) challenges through professional and conviction integrity programs, programs that draw upon similar review and compliance approaches in medical care and business.¹²³ These would involve reforms within a prosecutor's office. Proposed reforms range from careful implementation of checklists to clarifying the scope of required discovery within offices to review of "near misses"¹²⁴ and *Brady* failures.¹²⁵ More generally, the contemplated reforms aim to put explicit procedures in place that support both prophylactic approaches to avoid *Brady* error and careful review when such error or "near misses" have occurred.¹²⁶

Like the proposal above for increased access to evidence before charging, such programs seek change where change is likely to have real impact, within the prosecutor's office itself. They recognize how cognitive bias can permeate evidence evaluations. They aim to integrate devices for making documentation of evidence more automatic and easier for prosecutors, for example, phones that simplify the recording of witness statements.¹²⁷ They respect prosecutorial responsibilities and esprit de corps.¹²⁸ To the extent, as suggested by Professor Yaroshefsky's research discussed above, that high caseloads and other limited resources currently undermine effective *Brady* evaluations within prosecutorial offices, these

(1) expire at a time when the court in which the magistrate is sitting is not in session, that time shall be extended to include the duration of the next court session on the judicial day immediately following. If the 48-hour period expires at a time when the court in which the magistrate is sitting is in session, the arraignment may take place at any time during that session. However, when the defendant's arrest occurs on a Wednesday after the conclusion of the day's court session, and if the Wednesday is not a court holiday, the defendant shall be taken before the magistrate not later than the following Friday, if the Friday is not a court holiday.").

123. Scheck, *supra* note 33, at 2216–17.

124. *Id.*

125. *See, e.g., id.*

126. *Id.*

127. Scheck, *supra* note 33, at 2232.

128. Professor Scheck refers to being able to reflect and discuss in "protected space." *Id.* at 2224.

concerns about resource limitations, however, might also apply to some of the components of the programs recommended by Professor Scheck. Nonetheless, some jurisdictions have implemented conviction integrity programs and best practices committees, and reports about their effectiveness more generally have been quite favorable.¹²⁹ These programs, depending on their specific scope, can offer a variety of valuable protective strategies against *Brady* error, but may be highly resource intensive approaches for an individual prosecutor's office.

C. COGNITIVE BIAS TRAINING

Empirical research supports the value of training regimens in some contexts to help individuals reduce their cognitive bias.¹³⁰ As a consequence, *Brady* scholars and researchers in other disciplines recommend educating people about their own biases.¹³¹ Nonetheless, even advocates of such an approach recognize it has limitations. Professor Burke explains that “although education about cognitive bias may hold some potential to improve prosecutorial decision making, it is doubtful that education alone will assure prosecutorial neutrality.”¹³² While recognizing that such training is not a panacea, to the extent that such training can be implemented in a cost-effective way, this approach seems worth including in the set of available remedies to *Brady* failure.

D. INVOLVING UNBIASED DECISION MAKERS

One scholar recommends involving unbiased decision makers in the evidence evaluation process by turning the decisions over to a neutral, in particular a judicial, decision maker.¹³³ In another variation of this approach, the disclosure

129. For a discussion of such programs, see, e.g., Daniel Kroepsch, *Prosecutorial Best Practices Committees and Conviction Integrity Units: How Internal Programs are Fulfilling the Prosecutor's Duty to Serve Justice*, 29 GEO. J. LEGAL ETHICS 1095, 1105 (2016).

130. See, e.g., Laurie A. Rudman, Richard D. Ashmore & Melvin L. Gary, “Unlearning” Automatic Biases: The Malleability of Implicit Prejudice and Stereotypes 81 J. PERSONALITY & SOC. PSYCHOL. 856, 861 (2001) (“Students exposed to coursework and class discussion designed to foster respect for diversity showed a significant reduction in both their prejudice and stereotype IAT scores.”); Burke, *Improving*, *supra* note 7, at 1617–18 (discussing Lee Ross, Mark R. Lepper & Michael Hubbard, *Perseverance in Self-Perception and Social Perception: Biased Attributional Processes in the Debriefing Paradigm*, 32 J. PERSONALITY & SOC. PSYCHOL. 880, 882 (1975)). Consider also Sophia Lebrecht, Lara J. Pierce, Michael J. Tarr & James W. Tanaka, *Perceptual Other-Race Training Reduces Implicit Racial Bias*, 4 PLOS ONE 1, 1 (2009). Not all research in which participants were exposed to information or policies about bias or harassment suggests that such exposure reduces bias. See, e.g., Justine Eatenson Tinkler, Yan E. Li & Stefanie Mollborn, *Can Legal Interventions Change Beliefs? The Effect of Exposure to Sexual Harassment Policy on Men's Gender Beliefs*, 70 SOC. PSYCHOL. Q. 480, 491 (2007) (reporting that exposing men to sexual harassment policy “strengthen [ed] male-advantaged gender beliefs, though only implicitly rather than explicitly”).

131. Burke, *Improving*, *supra* note 7, at 1616–18.

132. *Id.* at 1618; see also Stanley P. Williams, Jr., *Double-Blind Justice: A Scientific Solution to Criminal Bias in the Courtroom*, 6 IND. J.L. & SOC. EQUALITY 48, 62–63, 69 (2018) (discussing limitations of bias awareness training, particularly in the context of training judges, and more generally proposing a double-blind approach where “both the judge and jury will no longer view or hear the defendant, except when the defendant testifies” to reduce bias in the courtroom).

decision is subject to review by persons other than the line prosecutor who is handling the specific case.¹³⁴ These persons could include a supervisor or committee of prosecutors.¹³⁵ One can readily perceive value in *Brady* disclosure to involving decision makers for whom the Guilt Perspective is not (yet) entrenched.

In the first iteration of this approach, *Brady* discovery disclosure would lie in the realm of the judge, who, through an in camera proceeding would “review . . . all information in the prosecutor’s custody.”¹³⁶ This could largely exempt prosecutors from having to evaluate the evidence for disclosure purposes.¹³⁷ Such an approach would likely mitigate the effects of cognitive bias on the disclosure process. The judge would play the single role of evaluator, rather than the dual role of evaluator and advocate. For some prosecutors, being relieved of this obligation would be a blessing, withdrawing them from difficult judgment calls and from the personally contentious litigation about their decisions on disclosure post-conviction. Correspondingly, however, substantial resources would be needed at the judicial level to evaluate evidence in the millions of cases in which a prosecutor’s office performs that function currently,¹³⁸ not to mention the likely overhead that would be needed in prosecutors’ offices to prepare the evidence for such judicial review. In addition, to the extent that key *Brady* evidence remains with other law enforcement actors and does not arrive in the prosecutor’s file, judicial determinations of disclosable evidence based on the contents of a prosecutor’s file are unlikely to provide adequate disclosure.

In the second iteration, one that might function as part of the larger professional and conviction integrity process discussed earlier, in addition to a line prosecutor’s review, a supervisor or group of prosecutors would review the evidence.¹³⁹ To the extent that those individuals are not invested in the particular case in the same way as the line prosecutor and do not possess a Guilt Perspective at the time of such review, their involvement may enable a detour around the cognitive biases that can descend with the rooting of the Guilt Perspective. Moreover, internal reviews may cause less reactance or negative response by a line prosecutor. Because much *Brady* error presumably goes undetected, having the detection procedure be an internal one may encourage disclosure as the recommendations are made by colleagues who share the same specific roles and mission and before

133. See Capra, *supra* note 74, at 397–98.

134. See, e.g., Findley & Scott, *supra* note 7, at 389. See generally *id.* at 389 n.498 and accompanying text (citing Darryl K. Brown, *The Decline of Defense Counsel and the Rise of Accuracy in Criminal Adjudication*, 93 CALIF. L. REV. 1585, 1619–21 (2005)).

135. *Id.* at 389.

136. See Capra, *supra* note 74, at 397–98.

137. Except perhaps for requests for protective orders.

138. See RICHARD Y. SCHAUFFLER, ROBERT C. LAFOUNTAIN, SHAUNA M. STRICKLAND, KATHRYN A. HOLT & KATHRYN J. GENTHON, COURT STATISTICS PROJECT, EXAMINING THE WORK OF STATE COURTS (2016), <http://www.courtstatistics.org/~media/Microsites/Files/CSP/EWSC%202015.ashx> [<https://perma.cc/W5NE-675Y>] (providing a chart showing millions of cases in incoming caseloads for state courts in 2015).

139. See Burke, *Improving*, *supra* note 7, at 1621.

there are public accusations of failure to disclose. Nonetheless, an entirely internal process also risks having evaluators who are prone to the same Guilt Perspective as the line prosecutor, particularly on a case that has already been charged. This risk of being unintentionally co-opted applies not just to prosecutors but perhaps even to outsiders who might regularly join such review committees.

One might explore the possibility of adding a defense attorney to such a review committee, in hopes that such co-optation would not occur. Having a defense attorney reviewing evidence poses other challenges, like those involving conflicts of interest and inappropriate access to confidential information, but might be worth considering. Nonetheless, each of the review processes described would require resources, potentially substantial resources, to be effective, depending on the scope and number of cases subject to such review.

E. OPEN-FILE POLICIES

One method that has been proposed to avoid *Brady* error anticipates prosecutors opening their own and/or related law enforcement files to the defense and disclosing all evidence, which is not otherwise protected by other rules, orders, or policies. From a logical standpoint, the open-file policy or disclose-all-non-protected-evidence approach, if scrupulously applied, is probably the most likely of those discussed so far to result in existing evidence that is favorable to the accused being disclosed, and, correspondingly, the fewest *Brady* errors. Scholars note that the number of jurisdictions that have adopted open-file approaches still represents fewer than half of the states, but that interest in more expansive discovery is growing.¹⁴⁰

Scholars have also recently turned their attention to conducting research on the impact of this approach.¹⁴¹ Professors Turner and Redlich, for example, compare the pre-plea statutorily-imposed open-file approach in North Carolina with what they characterize as a more traditional approach in Virginia.¹⁴² They note

140. See Turner & Redlich, *supra* note 76, at 304 (identifying seventeen states with a type of open-file discovery policy and describing those as still “a minority,” but explaining that “the trend in recent years is in the direction of broader and earlier discovery”).

141. Turner & Redlich, *supra* note 76, at 314 (“We have uncovered only five empirical studies of discovery practices, and while these studies provided important information on certain aspects of discovery, none aims to address the questions above in a comprehensive manner.” (citing and describing in the accompanying footnote, LAURAL HOOPER ET AL., A SUMMARY OF RESPONSES TO A NATIONAL SURVEY OF RULE 16 OF THE FEDERAL RULES OF CRIMINAL PROCEDURE AND DISCLOSURE PRACTICES IN CRIMINAL CASES: FINAL REPORT TO THE ADVISORY COMMITTEE ON CRIMINAL RULES (2011); N.Y. CTY. LAWYERS’ ASS’N, DISCOVERY IN NEW YORK CRIMINAL COURTS: SURVEY REPORT AND RECOMMENDATIONS 1 (2006); William Bradford Middlekauff, *What Practitioners Say About Broad Criminal Discovery Practice: More Just—Or Just More Dangerous?*, 9 CRIM. JUST. 14 (1994); TEX. CRIM. DEF. LAWYERS ASS’N & MANAGING TO EXCELLENCE CORP., THE COST OF COMPLIANCE: A LOOK AT THE FISCAL IMPACT AND PROCESS CHANGES OF THE MICHAEL MORTON ACT IV-V (2015); TEX. DEF. SERV. & TEX. APPLESEED, IMPROVING DISCOVERY IN CRIMINAL CASES IN TEXAS: HOW BEST PRACTICES CONTRIBUTE TO GREATER JUSTICE (2013)).

142. *Id.* at 373–80.

that their survey revealed that, as one might expect, “[o]pen-file rules appear to make the most difference where the exculpatory nature of the evidence is not obvious.”¹⁴³ Their findings also “suggest that neither open-file nor closed-file rules ensure consistent disclosure of *Brady* evidence when the evidence is in the possession of investigating agencies, rather than prosecutors.”¹⁴⁴ The researchers further indicate that they “found little evidence to suggest that open-file discovery increases risks to the safety of witnesses.”¹⁴⁵ Overall, they conclude that “[w]hile the open-file system may not always produce better disclosure of impeachment or all categories of exculpatory evidence, it does generally enhance disclosure of most types of evidence. It also appears to reduce discovery disputes and promote speedier dispositions of cases.”¹⁴⁶

The researchers acknowledge a number of “[m]ethodological [c]aveats,”¹⁴⁷ including that their survey-based study “tests perceptions of discovery practices rather than directly monitoring the practices themselves.”¹⁴⁸ In a published critique of the study, Professor Miriam Baer also raises caveats about the study, including concerns about the sample size and about the generalizability of the results, related to, *inter alia*, possible selection and status quo biases.¹⁴⁹ For example, Professor Baer laments that prosecutors in large urban areas with complex cases and often corresponding concerns of witness intimidation “very likely did not participate in the study at all.”¹⁵⁰

A Virginia prosecutor also published a response to Professors Turner and Redlich’s article, expressing concerns about the survey.¹⁵¹ A number of the concerns in that response, whose title suggests that it represents views of Virginia prosecutors more generally, echoed concerns surfaced by Professor Baer.¹⁵²

Another study of open-file approaches examines outcomes for defendants in two jurisdictions which have open-file policies.¹⁵³ According to the study, and as viewed through a proxy of suppression litigation, although evidentiary disclosure does appear to increase in those jurisdictions,¹⁵⁴ Professor Grunwald

143. *Id.* at 295.

144. *Id.* at 296.

145. *Id.* at 383.

146. *Id.* at 297.

147. *Id.* at 373.

148. *Id.* at 374.

149. See Miriam H. Baer, *Some Skepticism About Criminal Discovery Empiricism*, 73 WASH. & LEE L. REV. ONLINE 347, 349 (2016).

150. *Id.* at 352.

151. See Michael R. Doucette, *Virginia Prosecutors’ Response to Two Models of Pre-Plea Discovery in Criminal Cases: An Empirical Comparison*, 73 WASH. & LEE L. REV. ONLINE 415 (2016).

152. *Id.* at 416–20. Mr. Doucette also raises a number of concerns beyond those in Professor Baer’s response. For Professors Turner and Redlich’s reply addressing concerns raised by both Mr. Doucette and Professor Baer, see Jenia I. Turner & Allison D. Redlich, *Reply to Miriam Baer and Michael Doucette’s Reviews of Two Models of Pre-Plea Discovery in Criminal Cases*, 73 WASH. & LEE L. REV. ONLINE 471, 471 (2016).

153. Grunwald, *supra* note 77, at 810.

reports “relatively little evidence that defendants fared significantly better in terms of charging, plea bargaining, and sentencing, or that the trial rate or time-to-disposition fell as a result of open-file.”¹⁵⁵ As a result of his research, Professor Grunwald opines that:

effects of open-file are fragile and contingent on a range of extrinsic institutional circumstances: most importantly, on the availability of resources for public defense; on the myopia of police investigations; and on the adaptive behavior of police and prosecutors in the collection of evidence and assembly of the file. As a result, open-file may not work as a standalone fix.¹⁵⁶

An open-file policy relieves the prosecutor of some decision making about evidence disclosure. Whether particular evidence should be exempt or merits seeking a protective order generally remains within prosecutorial discretion even in open-file jurisdictions, and research suggests that jurisdictions have adopted a variety of avenues to protect witnesses within such jurisdictions.¹⁵⁷ Whether open-file policies fully resolve *Brady* error concerns remains subject to debate. For example, one worry that has been expressed is that such policies might discourage evidence collection by law enforcement: “[I]f police and prosecutors can predict the probability that investigative activities produce exculpatory evidence, they may be less likely to engage in those activities that are likely to produce it. And, if they find exculpatory evidence, they may be less likely to record, collect, or insert it into the file.”¹⁵⁸ The literature also reflects concern that “[i]mplementing open-file discovery is costly for prosecutor’s offices, which may already be operating under tight budgets. Due to limited resources, a prosecutor’s office may file charges in fewer cases.”¹⁵⁹ Moreover, if a focus on *Brady* were no longer part of the prosecutorial calculus on a regular basis, prosecutors might not be as attentive to ensuring that casual conversations with witnesses or impeachment materials in general get documented. As above, open-file policies also generate concerns about witness safety.¹⁶⁰

The data and analysis presented here introduce the importance of research on the attributes of open-file approaches. More is needed as the debate about its

154. *Id.* at 808–10.

155. *Id.* at 777.

156. *Id.* at 777–78.

157. *Id.* at 793–94 (describing a variety of mechanisms for protecting witnesses).

158. *Id.* at 797 (footnote omitted).

159. Grunwald, *supra* note 77, at 798; Turner & Redlich, *supra* note 76, at 311 (raising concerns about burden on prosecutors and noting that “[o]pen-file discovery is also expected to require additional manpower to redact documents containing sensitive information and to litigate protective measures”).

160. Turner & Redlich, *supra* note 76, at 309–10 (footnote omitted) (“The first and chief concern is that open-file discovery endangers witness safety and witness privacy and therefore conflicts with the government’s duty to protect the public. Relatedly, opponents of open-file worry that disclosure of witness information would discourage some citizens from cooperating with law enforcement and jeopardize the integrity of investigations.”).

value and effectiveness continues. Ideally, by disclosing all evidence not exempt or within the scope of a protective order, a scrupulously applied open-file approach, especially one implemented through early or pre-plea discovery and coupled with a similar expectation about related law enforcement files, could substantially decrease *Brady* violations.

Most importantly in terms of the question of prosecutors' cognitive bias, while a trend toward greater disclosure and open-file policies is in progress, researchers suggest that most jurisdictions, including the federal government through the Offices of the United States Attorneys, have not adopted such policies.¹⁶¹ Some may, indeed, be disinclined to adopt such policies. Consequently, while open-file policies may, depending on the results of further research, represent a sought-after, long-term ideal,¹⁶² in the interim, *Brady* violations persist in jurisdictions across the nation. Moreover, even open-file policies depend upon decision making by prosecutors, decision making in which the Guilt Perspective and ensuing

161. *Id.* at 304–06; U.S. DEP'T OF JUSTICE, U.S. ATTORNEYS' MANUAL §§ 9-5.000–9-5.002, <https://www.justice.gov/usam/usam-9-5000-issues-related-trials-and-other-court-proceedings> [<https://perma.cc/ELZ4-4Z37>]:

Providing broad and early discovery often promotes the truth-seeking mission of the Department and fosters a speedy resolution of many cases. It also provides a margin of error in case the prosecutor's good faith determination of the scope of appropriate discovery is in error. Prosecutors are encouraged to provide broad and early discovery consistent with any countervailing considerations. But when considering providing discovery beyond that required by the discovery obligations or providing discovery sooner than required, prosecutors should always consider any appropriate countervailing concerns in the particular case, including, but not limited to: protecting victims and witnesses from harassment or intimidation; protecting the privacy interests of witnesses; protecting privileged information; protecting the integrity of ongoing investigations; protecting the trial from efforts at obstruction; protecting national security interests; investigative agency concerns; enhancing the likelihood of receiving reciprocal discovery by defendants; any applicable legal or evidentiary privileges; and other strategic considerations that enhance the likelihood of achieving a just result in a particular case. . . . Prosecutors should never describe the discovery being provided as "open file." Even if the prosecutor intends to provide expansive discovery, it is always possible that something will be inadvertently omitted from production and the prosecutor will then have unintentionally misrepresented the scope of materials provided. Furthermore, because the concept of the "file" is imprecise, such a representation exposes the prosecutor to broader disclosure requirements than intended or to sanction for failure to disclose documents, e.g., agent notes or internal memos, that the court may deem to have been part of the "file." When the disclosure obligations are not clear or when the considerations above conflict with the discovery obligations, prosecutors may seek a protective order from the court addressing the scope, timing, and form of disclosures.

Id. at § 9.5002.

162. In a very recent study, unpublished at the time the summary was sent to the author, in a controlled laboratory setting, Professor Allison Redlich and Samantha Luna explored, *inter alia*, whether telling participants (university students) that they worked as prosecutors in an open-file (versus a "closed-file") discovery jurisdiction affected their disclosure of the four pieces of exculpatory evidence in a mock case. ALLISON D. REDLICH & SAMANTHA LUNA, INVESTIGATING PROSECUTORIAL DISCOVERY: AN EXPERIMENTAL STUDY (2018) (result summary from Redlich on file with author). The researchers report that "[m]ock prosecutors in open-file conditions [were] less likely to commit prosecutorial misconduct" as measured by disclosure of the items of exculpatory evidence to the defense. *Id.* More generally, the researchers write that "[a]lthough in need of replication with actual prosecutors, [their] findings suggest that open-file discovery resulted in increased discovery to the defense, lower likelihood of potential misconduct, and more lenient plea offers." *Id.*

cognitive biases may still frustrate necessary disclosure. Thus, attention to reducing prosecutorial cognitive bias remains an essential inquiry.

F. SWITCHING ROLES

One of the most provocative and potentially effective methods proposed for disrupting the Guilt Perspective, which can give rise to the cascade of cognitive biases, is that of switching roles. Switching roles is a form of perspective taking, an approach that has been the subject of substantial cognitive science research.¹⁶³

In the cognitive science literature, traditional mental simulation perspective taking involves “the process of imagining the world from another person’s perspective.”¹⁶⁴ Such perspective taking may involve imagining how another feels or perceives the world or it may more directly involve imagining yourself as the other.¹⁶⁵ Although there remains debate about some of the precise cognitive mechanisms involved in understanding “how perspective taking encourages prosocial behavior and empathy,”¹⁶⁶ research suggests that “[p]erspective taking . . . is a powerful intervention technique that has been used to reduce the accessibility of stereotypes and negative outgroup attitudes.”¹⁶⁷

For example, researchers report that such perspective taking can produce “positive empathetic feelings”¹⁶⁸ even toward members of a “highly stigmatized group.”¹⁶⁹ In one such experiment, participants listened to an audiotape of an individual, who ostensibly was a convicted murderer, explain the crime and his

163. For research on perspective taking, see, for example, *infra* notes 164–176 and accompanying text.

164. Oh et al., *supra* note 17, at 399.

165. Herrera et al., *supra* note 18, at 2–3.

166. Oh et al., *supra* note 17, at 399.

167. *Id.* (citation omitted); see also, e.g., Andrew Todd, Galen V. Bodenhausen, Jennifer A. Richeson & Adam D. Galinsky, *Perspective Taking Combats Automatic Expressions of Racial Bias*, 100 J. PERSONALITY & SOC. PSYCHOL. 1027, 1038 (2011) (reporting that “[r]esults obtained across five experiments—using two different perspective-taking manipulations; two different comparison conditions; and a combination of self-report, latency-based, and behavioral dependent measures—consistently document the merits of perspective taking for generating more favorable automatic interracial evaluations, approach-avoidance tendencies, and interpersonal behaviors”). But researchers report that “perspective taking can change dramatically depending on the relational context (i.e., cooperation vs. competition).” Jason R. Pierce, Favin J. Kilduff, Adam D. Galinsky & Niro Sivanathan, *From Glue to Gasoline: How Competition Turns Perspective Takers Unethical*, 24 PSYCHOL. SCI. 1986 (2013). The researchers opine that “[a]lthough perspective taking has long been thought of as the glue that binds people together, our experiments demonstrate that it can also act as gasoline that fuels competitive and self-protective impulses, leading to deceptive and exploitative behavior, possibly as a prophylactic against exploitation by others.” *Id.* at 1993. In other studies, researchers reported that perspective taking can “diminish egocentric assessments of fairness.” Nicholas Epley, Eugene M. Caruso & Max H. Bazerman, *When Perspective Taking Increases Taking: Reactive Egosim in Social Interaction*, 91 J. PERSONALITY & SOC. PSYCHOL. 872, 886 (2006). But they report that, in a competitive context, it could also trigger reactive egoism. *Id.* Context will thus be of significant importance in designing experiments related to prosecutorial perspective taking.

168. C. Daniel Batson, Marina P. Polycarpou, Eddie Harmon-Jones, Heidi J. Imhoff, Erin C. Mitchener, Lori L. Bednar, Tricia R. Klein & Lori Highberger, *Empathy and Attitudes: Can Feeling for a Member of a Stigmatized Group Improve Feelings Toward the Group?*, 72 J. PERSONALITY & SOC. PSYCHOL. 105, 177 (1997).

169. *Id.* at 116.

current reflections on it.¹⁷⁰ Participants in the condition that was focused on high empathy were asked to imagine how the speaker felt and to “[t]ry to feel the full impact of what this [person] has been through and how [the person] feels as a result.”¹⁷¹ Researchers reported that “although there was only limited evidence of an effect of inducing empathy for a convicted murderer on attitudes toward murderers measured immediately, there was clear evidence of an effect 1 to 2 weeks later.”¹⁷² Consistent with the research above involving imagining another person’s experience, researchers also explain that “[e]xplicitly assuming the perspective of a member of an out-group and imagining oneself as that person can reduce stereotypes about that out-group.”¹⁷³

With respect to perspective taking generally, researchers contend that “one of the strongest implications of perspective taking is increased *self-other overlap*, or greater overlap between mental representations of the self and other people. People were more likely to ascribe their traits to a target person when they had previously engaged in a perspective taking exercise[.]”¹⁷⁴ Professor Bailenson indicates that “[t]hinking similarly to another person literally causes changes in cognitive structures, such that one’s thoughts concerning the other become more ‘selflike’”¹⁷⁵ Thus, ascribing one’s own traits to another can make it easier to connect to and feel positive about the other.¹⁷⁶

170. *Id.* at 114.

171. *Id.* at 108, 114.

172. *Id.* at 116.

173. GROOM ET AL., *supra* note 18, at 3; Harry Farmer & Lara Maister, *Putting Ourselves in Another’s Skin: Using the Plasticity of Self-Perception to Enhance Empathy and Decrease Prejudice*, 30 SOC. JUST. RES. 323, 337 (2017) (“[P]erspective-taking] not only leads to a reduction in prejudice against others, but it appears to achieve this by creating a new association between the self and that other.”). Not all research reaches the same conclusions. *See, e.g., id.* at 337–38 (describing and critiquing a study that did not lead to prejudice reduction as using a “relatively basic” approach and contrasting it with more immersive approaches, which often, although not uniformly, find reductions in bias); Herrera et al., *supra* note 18, at 3 (noting perspective taking studies that, in certain contexts, led to increases in stereotyping).

174. Oh et al., *supra* note 17, at 399 (describing and citing the research of Adam D. Galinsky, Gillian Ku & Cynthia S. Wang, *Perspective-Taking and Self-Other Overlap: Fostering Social Bonds and Facilitating Social Coordination*, 8 GROUP PROCESSES & INTERGROUP RELATIONS 109 (2005) and Mark H. Davis, Laura Conklin, Amy Smith & Carol Luce, *Effect of Perspective Taking on the Cognitive Representation of Persons: A Merging of Self and Other*, 70 J. PERSONALITY & SOC. PSYCHOL. 713 (1996)). Recent scholarship contends that “there is now strong evidence that this change in attitudes is driven by an increase in self-association towards the other rather than alternative possibilities such as an increase in empathy for the other person.” Farmer & Maister, *supra* note 173, at 337.

175. BAILENSON, *supra* note 20, at 82.

176. *See, e.g.,* Farmer & Maister, *supra* note 173, at 340–41 (describing studies that “highlight the role that embodiment can play in blurring the boundaries between self and other and its value in changing both attitudes and more low-level bodily responses towards other social groups and individuals”); Davis et al., *supra* note 174, at 718 (“Taken as a whole, the findings offer some support for the notion that perspective taking leads observers to attribute a greater proportion of their self-descriptors to other, unfamiliar individuals, and that the net result of this process is a greater level of overlap between the cognitive representations of self and target.”). Recent research suggests, however, that perspective taking may not increase accuracy in forecasting the views of a partner. Tal Eyal, Mary Steffel & Nicholas Epley, *Perspective Mistaking: Accurately Understanding the Mind of Another Requires Getting Perspective, Not Taking Perspective*, 114 J. PERSONALITY & SOC. PSYCHOL. 547, 561

Switching roles may assume a variety of forms. Professor Burke, for example, recommends that prosecutors engage in the common law school exercise of playing “devil’s advocate”¹⁷⁷ and “generating pro-defense counterarguments to [a prosecutor’s] own . . . interpretations of the evidence against the defendant.”¹⁷⁸ Given the research on perspective taking, this straightforward exercise could help a prosecutor to better understand possible defense theories and the evidence that might support them and encourage recognition of *Brady* evidence.¹⁷⁹

More literal role switches might also be considered. As former Justice O’Connor noted in another context, barristers in Britain work as defense counsel as well as prosecutors and may change sides depending on the case.¹⁸⁰ This elevates the perspective-taking approach to a different level. Based on the studies on perspective taking more generally, it is reasonably likely that such a flip would increase empathy and self-other overlap, thereby modifying the Guilt Perspective, and reducing subsequent cognitive bias against the accused. While prosecutors in the U.S. do, with some frequency, leave their offices and become defense counsel, in general, it is fairly rare to make such a switch on a short-term, temporary basis. Moreover, the practical logistics and obstacles to this version of role switching, particularly as a required component of prosecutorial work, are formidable. Concerns here include those of clients about attorney loyalty, conflicts, effective assistance of counsel, and competence in the wake of the initial switch. In addition, the financial costs to an office and emotional resistance of many prosecutors would likely be substantial.¹⁸¹

With respect to these two types of perspective-taking options, playing devil’s advocate is a worthwhile and low-cost option, although perhaps not powerful enough to significantly alter an entrenched Guilt Perspective. Moreover, it may be that those prosecutors with the most entrenched Guilt Perspective are least amenable to engaging effectively in the exercise. Certainly, we would benefit from further empirical evaluation of this inexpensive option. In contrast, the actual switching of roles seems too costly and likely unappealing as an option for many prosecutors (not to mention for some defenders whose jobs the prosecutors

(2018) (“Across nine experiments consisting of naturalistic tests of interpersonal accuracy—predicting a partner’s preferences and opinions—we found that an explicit instruction to engage in perspective taking did not increase accuracy. If anything, it decreased accuracy.”).

177. Burke, *Improving*, *supra* note 7, at 1620.

178. *Id.* at 1618–20; *see also* Findley & Scott, *supra* note 7, at 388–89.

179. For a discussion of benefits and risks of using alternative hypotheses in criminal investigations to try to debias confirmation bias, *see* SIMON, *supra* note 14, at 45. For recommendations, which are informed by an analysis of much research on cognitive bias and its impact on the criminal justice system and which aim to enhance accuracy in the criminal justice process and the results it generates, *see*, for example, *id.* at 204–22.

180. Emma Schwartz, *Justice O’Connor’s Wish: A Wand, Not a Gavel*, U.S. NEWS (Nov. 7, 2007), <https://www.usnews.com/news/national/articles/2007/11/07/justice-oconnors-wish-a-wand-not-a-gavel> (last visited Mar. 7, 2019).

181. It is also possible that defense attorneys could switch sides to become prosecutors, carrying with them the advantages of a defense perspective into their prosecutorial decision-making.

might be taking). Therefore, resistance to implementation would probably be high.

Each of the six approaches discussed above has valuable potential to reduce *Brady* error. They operate in different ways, with some attempting to dislodge or modify the Guilt Perspective and others largely potentially bypassing it, through, for example, open-file disclosure. Each, however, has its own costs or limitations that may prevent or limit its implementation or effectiveness. Consequently, additional approaches merit consideration. Part IV below explores a low overhead, potentially time-effective and cost-efficient approach that might modify the Guilt Perspective and resulting cognitive biases to change prosecutorial behavior to increase appropriate disclosure.

IV. SCIENTIFIC RESEARCH ON VIRTUAL REALITY, EMBODIED PERSPECTIVE TAKING, AND DIGITAL AVATARS

Emerging innovations in cognitive science research suggest that immersive virtual environments can modify one's perspective and reduce cognitive bias.¹⁸² As discussed above, researchers have long employed the technique of perspective taking to try to enhance empathy and reduce cognitive bias.¹⁸³ Inhabiting an avatar represents a radically enhanced form of traditional perspective taking. Empirical research using digital avatars, when appropriately designed and engaged, has shown significant reductions in explicit and implicit bias, both immediately and at least in short-term subsequent behavior of participants.¹⁸⁴ Because experimenters see significant changes with a single engagement of less than twenty minutes,¹⁸⁵ if these innovative approaches can be applied to the process involved in prosecutorial decision making, they might produce significant, rapid, and positive change in terms of reduction of the bias that may distort information processing. If appropriate modification of the Guilt Perspective can be achieved, prosecutors may more readily recognize the favorable nature of evidence and be more inclined to disclose that evidence.

A. EMPIRICAL RESEARCH ON DIGITAL AVATARS AND COGNITIVE BIAS

Avatars represent a primary medium of engagement in the virtual world today. These, often anthropomorphized, animated, three-dimensional representations, enable individuals, like video game players and research participants, to take on the "body" and persona of others in a computer-generated virtual reality.¹⁸⁶ The

182. See, e.g., Ahn et al., *supra* note 19, at 30–31; Banakou et al., *supra* note 18, at 10; Béatrice S. Hasler, Bernhard Spanlang & Mel Slater, *Virtual Race Transformation Reverses Racial In-Group Bias*, 12 PLoS ONE 1, 12 (2017); Peck et al., *supra* note 19. But see GROOM ET AL., *supra* note 18, at 15.

183. See *supra* notes 164–176 and accompanying text.

184. See, e.g., Banakou et al., *supra* note 18; Ahn et al., *supra* note 19, at 30; Farmer & Maister, *supra* note 173, at 340–42.

185. See, e.g., Ahn et al., *supra* note 19.

186. Scarborough & Bailenson, *supra* note 22, at 130.

participant's avatar could be taller, younger, older, of a different race or ethnicity or gender, or a dragon or an elf, almost as different from the participant's original self as one could imagine. In an immersive virtual environment, researchers create the avatar in a "computer-generated environment in which the user can perceive, feel and interact in a manner that is similar to a physical place."¹⁸⁷ The goal is to develop a fully immersive experience in which the artificial computer-generated setting and space substitute for, and temporarily become, the real world for the participant. One might imagine entering the Holodeck in a Star Trek episode, except that the participant can also take on a new body appearance and persona in the form of an avatar.¹⁸⁸ Avatars allow researchers to create a near infinite variety of embodied perspective-taking experiences to investigate human perceptions and behavior.

Research suggests that "[b]ehavioral changes that are caused by avatars have been demonstrated to include both immediate adaptive changes"¹⁸⁹ as well as "longitudinal changes that can be measured over time."¹⁹⁰ Specifically, "the appearance and behavior of an avatar has been demonstrated to have immediate effects on the behavior of the user."¹⁹¹ Professors Jeremy Bailenson and Nick Yee label this the "Proteus effect."¹⁹² It describes the participant's experience of internalizing or transferring some dimensions of that virtual experience into the participant's real-world lived experience. Virtual reality researchers explain that "embodying another person is fundamentally different than imagining oneself as another person."¹⁹³ Because of the intensity of the immersive experience, avatars are a bit like traditional perspective taking on steroids.¹⁹⁴

Empirical research on the impact of virtual reality on perception and behavior is a young but rapidly growing discipline within academia. Research spans investigations from the impact of avatars on racial bias and on bias against the elderly and homeless persons to using avatars to reduce consumer consumption of products that have a negative impact on the environment and to increasing individual commitment to exercise.¹⁹⁵ As an introduction to this discipline and its potential

187. Parsons et al., *supra* note 18, at 2.

188. Analogies to the Holodeck in Star Trek are not uncommon in the literature on virtual reality and neuroscience. See, e.g., Michael J. Tarr & William H. Warren, *Virtual Reality in Behavioral Neuroscience and Beyond*, 5 NATURE NEUROSCIENCE SUPPLEMENT 1089, 1089 (2002).

189. Scarborough & Bailenson, *supra* note 22, at 130 (citing Yee & Bailenson, *supra* note 18).

190. *Id.* at 130 (citing Jesse Fox & Jeremy N. Bailenson, *Virtual Self-Modeling: The Effects of Vicarious Reinforcement and Identification on Exercise Behaviors*, 12 MEDIA PSYCHOL. 1 (2009)).

191. *Id.* at 131.

192. *Id.*

193. GROOM ET AL., *supra* note 18, at 14.

194. For a discussion of the potency of IVEs, see, for example, *supra* note 19 and accompanying text. The steroid Oxytocin itself has also been the subject of study in the context of perspective taking and avatars. See, e.g., Tong Yue, Yuhan Jiang, Caizhen Yue & Xiting Huang, *Differential Effects of Oxytocin on Visual Perspective Taking for Men and Women*, 11 FRONTIERS BEHAV. NEUROSCIENCE 1, 1 (2017) ("investigat[ing] the effects of OXT [Oxytocin] on men and women in visual perspective taking tasks").

195. See *infra* notes 196–261. Scholars have also been turning their attention to surveying existing applications and proposing and evaluating innovative new applications of virtual reality in and for the justice system.

application to the *Brady* context, we consider several pertinent research studies here.

1. EMPIRICAL RESEARCH ON DIGITAL AVATARS, COGNITIVE BIAS, AND RACE

Over the course of evolution, humans have developed a keen sense of self and other as well as of “intergroup bias, the systematic tendency to favor the ingroup over the outgroup.”¹⁹⁶ A number of essential studies in this domain focus on addressing bias by members of in-groups towards members of out-groups.¹⁹⁷ Distinguishing and favoring a group with which one affiliates oneself can serve positive functions in a variety of contexts.¹⁹⁸ It risks, of course, negative consequences as well, including diminished empathy and understanding of those in the out-group, and increased stigmatization and alienation of out-group members.¹⁹⁹ Perspective taking offers a well-researched technique for in-group members to

See, e.g., Jeremy Bailenson, Jim Blascovich, Andrew C. Beall & Beth Noveck, *Courtroom Applications of Virtual Environments, Immersive Virtual Environments, and Collaborative Virtual Environments*, 28 LAW & POL’Y. 249, 249–50, 262–65 (2006) (advocating for adoption of virtual reality uses in the courtroom, arguing that “this technology offers practical advantages for recreating crime and accident scenes, preparing witnesses, and experts, and conducting police lineups” as well as noting potential limitations and drawbacks); ADAM BENFORADO, UNFAIR: THE NEW SCIENCE OF CRIMINAL INJUSTICE 267–70 (2015) (advocating for virtual reality approaches to a variety of criminal justice processes, including virtual trials in which all the participants are virtual actors); Jay P. Kennedy & Bobbie Ticknor, *Studying Corporate Crime: Making the Case for Virtual Reality*, 7 INT’L J. CRIM. JUST. SCI. 416, 417 (2012) (“argu[ing] that the use of virtual reality (VR) as a methodological tool will greatly advance the study [of] corporate crime”); Carrie Leonetti & Jeremy Bailenson, *High-Tech View: The Use of Immersive Virtual Environments in Jury Trials*, 93 MARQ. L. REV. 1073, 1074, 1076 (2010) (exploring “whether immersive-virtual-environment (IVE) technology could be designed for and used during a jury trial” and noting that “[t]he power of an IVE, however, can be a double-edged sword” with jurors potentially accessing “a better understanding of the material facts at issue” or perhaps “risk[ing] manipulation or undue influence [as a result of] the experiential nature of VR” (footnote omitted)); Bobbie Ticknor & Sherry Tillinghast, *Virtual Reality and the Criminal Justice System: New Possibilities for Research, Training, and Rehabilitation*, 4 J. VIRTUAL WORLDS RES. 4 (2011). For example, in their 2011 article, Professor Bobbie Ticknor and Sherry Tillinghast discuss, *inter alia*, use by researchers to enhance replicability and validity of experimental procedures, use for training law enforcement in “scenarios that they are likely to experience while in the field,” *id.* at 14, and use “to enhance the skills required to manage offenders in a variety of situations,” *id.*, as well as uses for treatment and rehabilitation of offenders in a wide range of contexts, *id.* at 9–28. In her 2018 book, Professor Ticknor provides a focused discussion of current and potential uses of virtual reality in the correctional system for rehabilitative purposes. BOBBIE TICKNOR, VIRTUAL REALITY AND THE CRIMINAL JUSTICE SYSTEM: EXPLORING THE POSSIBILITIES FOR CORRECTIONAL REHABILITATION (2018). In a recent pilot study, Professor Ticknor used VR to provide cognitive behavior therapy for juvenile offenders in a residential treatment program. Bobbie Ticknor, *Pilot 1.0: Creating a Virtual Environment for the Treatment of Offenders*, CORRECTIONS TODAY (May 1, 2017), <https://www.thefreelibrary.com/Pilot+1.0%3A+Creating+a+virtual+environment+for+the+treatment+of+...+a0491848170> [<https://perma.cc/XM92-63QE>].

196. Oh et al., *supra* note 17, at 398 (emphasis omitted). Human behavior is, of course, incredibly complex. For an analysis of the subject, including insights and research about in-group and out-group dynamics and empathy, see ROBERT M. SAPOLSKY, BEHAVE: THE BIOLOGY OF HUMANS AT OUR BEST AND WORST 387–424, 521–52 (2017).

197. See, e.g., Oh et al., *supra* note 17, at 398.

198. See, e.g., Feng Fu, Martin A. Nowak, Nicholas A. Christakis & James H. Fowler, *The Evolution of Homophily*, 2 SCI. REP. 845 at 1 (2012) (examining how “[h]omophily, the tendency to interact with others of similar type” evolved, its prevalence in nature, and a number of benefits (and limitations) it can produce).

199. See, e.g., Farmer & Maister, *supra* note 173, at 331–32 (citations omitted).

enhance empathy for and understanding of the experience of those in the out-group.²⁰⁰ In the context of virtual reality, researchers have focused on contexts like age and race to investigate the impact of avatars on reducing the bias of in-group members towards out-group members.²⁰¹

Researchers suggest that “any social category that is salient during an interaction may lead to in/out-group distinction,”²⁰² but that people perceive race as a particularly powerful category signal.²⁰³ Racial discrimination represents a compelling harm in today’s society. Consequently, a range of studies in the virtual reality context focus on evaluating whether IVEs can reduce racial bias.²⁰⁴ Commonly, among the protocols, the study methodology includes the embodiment of a light-skinned individual in a dark-skinned avatar body and vice versa. Once inside the virtual domain, individuals engage with a virtual mirror in which they perceive themselves as the avatar with a different skin tone.²⁰⁵ With the administration of an Implicit Association Test (IAT)²⁰⁶ or another metric, researchers measure racial attitudes both before and after the IVE experience. Results of these studies vary,²⁰⁷ but a growing number suggest that IVEs can effectively reduce racial bias for at least some period following the immersion. For example, in a study published in 2016, Banakou and colleagues found “the technique of virtual embodiment, where a light-skinned person’s body is visually substituted in immersive virtual reality by a life-sized spatially coincident dark-skinned virtual body, results in a reduction in implicit bias that lasts at least 1 week.”²⁰⁸ In the Banakou study, participants engaged in the immersion experience for a five minute orientation to their virtual body followed by ten minutes of participation in the experiment activity (a Tai Chi lesson) on one, two, or three occasions, depending on their group.²⁰⁹ The researchers reported that implicit

200. See, e.g., *supra* note 167 and accompanying text.

201. See, e.g., Oh et al., *supra* note 17.

202. Hasler et al., *supra* note 182, at 2.

203. *Id.* at 2.

204. *Id.* at 1–2.

205. BAIENSON, *supra* note 20, at 84–85, 88–89.

206. See Anthony G. Greenwald, Debbie E. McGhee & Jordan L. K. Schwartz, *Measuring Individual Differences in Implicit Cognition: The Implicit Association Test*, 74 J. PERSONALITY & SOC. PSYCHOL. 1464 (1998).

207. See Hasler et al., *supra* note 182, at 2 (citing Peck et al., *supra* note 19; L. Maister, N. Sebanz, G. Knoblich & M. Tsakiris, *Experiencing Ownership Over a Dark-Skinned Body Reduces Implicit Racial Bias*, 128 COGNITION 170 (2013); Banakou et al., *supra* note 18; H. Farmer, A. Tajadura-Jimenez & M. Tsakiris, *Beyond the Colour of My Skin: How Skin Colour Affects the Sense of Body-Ownership*, 21 CONSCIOUSNESS & COGNITION 1242 (2012)); GROOM ET AL., *supra* note 18.

208. Banakou et al., *supra* note 18, at 1.

209. *Id.* at 3. The researchers note that, from their first experiment, “the evidence for the influence of multiple exposures is more ambiguous . . . there may be some effect even if not statistically significant” and, with respect to their second experiment, “that the Embodied Black condition does reduce implicit bias irrespective of the number of exposures. However, there is also evidence that bias also decreases with the number of exposures independently of the Embodiment factor.” *Id.* at 7.

bias decreased in each group, even in the group with only a single immersion exposure.²¹⁰

Recent work has also employed a metric beyond the IAT for measuring possible reduction in racial bias. In a study published in 2017, Béatrice Hasler and colleagues evaluated the occurrence of mimicry by individuals embodied in darker- and lighter-skinned avatars that were the opposite of their real-world appearances.²¹¹ The authors explain that previous research had demonstrated that people mimic the behaviors of those within their perceived in-group to a much greater extent than the behaviors of those in a perceived out-group.²¹² In Hasler's experiment, following immersion by light-skinned individuals in dark-skinned avatars and embodied interaction with another virtual character for one exposure of six minutes, the researchers found that light-skinned individuals engaged in mimicry more consistent with their virtual selves than with their real selves.²¹³ As the authors explain, "[I]n VR the skin color of participants' *virtual body* rather than their real body influences who they mimic more. Since mimicry is a non-conscious behavior that signifies social rapport this shows how actual behavior may be impacted through such virtual embodiment, beyond what can be found from implicit associations."²¹⁴

Not all IVE studies have reported a reduction in bias.²¹⁵ For example, in a study published in 2009, in what the authors describe as "the first to use IVEs to examine the effects of racial perspective taking,"²¹⁶ participants' racial bias did not decrease.²¹⁷ The authors explain that their experiment suggested that embodying a person who is a member of a racial group that has been subject to societal race discrimination did not reduce participants' "automatic racial bias[.]"²¹⁸ The researchers hypothesized that this may have been a function of stereotype activation, in which "[p]eople aware of stereotypes express implicit bias when stereotypes are activated, regardless of their agreement with them."²¹⁹ In a subsequent experiment, other researchers amended the experimental protocol and found that "embodiment of light-skinned participants in a dark-skinned VB [virtual body]

210. Banakou et al., *supra* note 18, at 7.

211. Hasler et al., *supra* note 182, at 1–2.

212. *Id.* at 2.

213. *Id.* at 4, 12. In this study, researchers found "no change in implicit racial bias as measured by the IAT simply as a result of the embodiment." *Id.* at 11. They note that "[t]his finding stands apart from all but one of the previous experiments that have used multisensory integration to achieve embodiment of White participants with a Black body (or body part in the case of the Rubber Hand Illusion)." *Id.* (citations omitted). The one previous experiment to which they refer is the Groom et al. experiment cited *supra* note 18 and described *infra* at notes 215–219 and accompanying text. *Id.* (citing GROOM ET AL., *supra* note 18).

214. Hasler et al., *supra* note 182, at 2.

215. See GROOM ET AL., *supra* note 18.

216. *Id.* at 3.

217. See *id.* at 14–16.

218. *Id.* at 14.

219. *Id.* (citation omitted). See also Farmer & Maister, *supra* note 173, at 343 for a discussion of the care needed to avoid stereotype activation.

significantly reduced implicit racial bias against dark-skinned people, in contrast to embodiment in light-skinned, purple-skinned or with no VB.”²²⁰

More directly relevant to the legal context, in an IVE experiment conducted to investigate racial bias and legal decision making, Natalie Salmanowitz hypothesized that virtual reality could “induce potent effects”²²¹ for reducing racial bias “without increasing cognitive load.”²²² Her first experiment sought “(1) to design an extremely subtle VR paradigm, capable of impacting IAT scores without increasing race salience, and (2) to determine if and how the VR experience influences legal decisions.”²²³

In addition to control groups for both the race condition and the virtual reality condition, her experiment placed participants in avatars that displayed a race different than their own (Black/White) in a real or sham virtual reality condition. In the sham condition, participants lacked an avatar and did not see a body attached to the hand-held controllers.²²⁴ For this study, in addition to other non-VR tasks, each participant engaged in a single exposure “five-minute virtual reality (VR) paradigm.”²²⁵

Ms. Salmanowitz summarizes the results of the experiment as follows:

After embodying a black avatar in the virtual world, participants produced significantly lower implicit racial bias scores than those who experienced a sham version of the virtual reality paradigm. Additionally, these participants more conservatively evaluated an ambiguous legal case, rating vague evidence as less indicative of guilt and rendering more Not Guilty verdicts.²²⁶

She also opines that “this result was achieved in a manner subtle enough for the courtroom setting.”²²⁷ As two of the takeaways from this study, Ms. Salmanowitz suggests that “embodying an outgroup avatar for five minutes can

220. Peck et al., *supra* note 19, at 779. The authors of this study suggest that there were several differences in the experimental protocols between their study and the Groom et al. study, *supra* note 18, including the length of the embodiment and the task that was assigned in the Groom et al. study. The researchers in the Peck et al. study “hypothesize that the increase in implicit racial bias scores found in the study of Groom et al. (2009) was due not to embodiment, but to the pre-exposure of being placed into a situation that is known for race discrimination. In [the Peck et al.] study the participants were given no task at all, except for the 5 min of observing their environment and virtual body, both directly by looking towards their body and in a mirror, and then watching the 12 virtual characters walk by.” Peck et al., *supra* note 19, at 785.

221. Salmanowitz, *Impact of Virtual Reality*, *supra* note 26, at 181.

222. *Id.*

223. *Id.* at 182.

224. *Id.* at 184 (“[T]hose in the Sham condition experienced the virtual world without any connection to a physical body.”).

225. *Id.* at 176.

226. *Id.* at 174. As a summative assessment of the first experiment, Ms. Salmanowitz explains that “the results suggest a generally positive impact of the VR paradigm on both implicit racial bias and legal decisions.” *Id.* at 195.

227. *Id.* at 194. For an article that outlined a virtual reality approach to reducing racial bias in the courtroom in anticipation of Ms. Salmanowitz’s actual experiment, see Salmanowitz, *Unconventional Methods*, *supra* note 26.

have a positive impact on implicit racial biases, [and] this experience can result in more cautious legal judgments in light of ambiguous evidence.”²²⁸

2. RESEARCH ON AVATARS, COGNITIVE BIAS, AGE, DISABILITY, AND HOMELESSNESS

Successful reductions of bias in contexts other than race also appear in the IVE scholarly literature. In a study, for example, on discrimination based on age (ageism), researchers explored whether perspective taking, using both traditional mental simulation (MS) approaches and immersive virtual environments (IVEs), reduced ageism in the young participants in the study.²²⁹ The researchers concluded that, although results varied depending on specific factors in the experimental design,²³⁰ their “study offers evidence that IVEs can yield greater benefits than MS for people who are in situations that make it difficult for them to take the perspective of an outgroup member.”²³¹

Similarly, research on IVEs and colorblindness supports the power of IVEs over more static types of perspective-taking experiences in changing people’s behaviors.²³² The researchers aimed to

foster greater self-other merging with persons with disabilities; increase favorable attitude[s] toward them; and assess whether the influence of these experiences could transfer to the physical world, leading to actual helping behavior. These effects were compared against traditional perspective taking methods that rely on imagination to assess the strengths and weaknesses of embodied experiences through IVET.²³³

The researchers found, for example, that in the third experiment “participants in the EE [Embodied Environment] condition demonstrated twice as much helping behavior compared to participants in the PT [traditional perspective-taking] condition.”²³⁴ The study authors note that “[r]egardless of best efforts to put themselves in the situation, people generally have a difficult time fully

228. Salmanowitz, *Impact of Virtual Reality*, *supra* note 26, at 199–200.

229. Oh et al., *supra* note 17; *see also* Domna Banakou, Sameer Kishore & Mel Slater, *Virtually Being Einstein Results in an Improvement in Cognitive Task Performance and a Decrease in Age Bias*, 9 *FRONTIERS PSYCHOL.* 1, 9 (2018) (reporting that “embodiment of young adults in the older Einstein body led to a reduction of implicit bias against elderly, resulting in overall lower IAT scores compared to the control condition (Normal body)”).

230. Oh et al., *supra* note 17, at 406–07. These studies sometimes explore the impact on bias within the context of a threat that the in-group perceives as posed by the out-group. For example, in the ageism study discussed here, researchers invoked the concern that our aging population will impose financial burdens on today’s youth. *See id.* at 407–08. The researchers noted that “when the level of intergroup threat is direct and concrete, increasing the level of immersion alone is not enough to overcome low levels of motivation to empathize with outgroup members.” Oh et al., *supra* note 17, at 407.

231. *Id.* at 407.

232. *See* Ahn et al., *supra* note 19.

233. *Id.* at 8.

234. *Id.* at 31.

appreciating the true nuances of the situation unless they are living the situation in that moment.”²³⁵

Recent research extends the evaluation of the impact of avatars on attitudes and behavior to their impact on attitudes and behavior toward people who are homeless.²³⁶ In the first of the two studies, researchers compared an IVE experience in which the participant’s avatar became homeless with a more traditional imagine-yourself-becoming-homeless non-IVE experience.²³⁷ This study pursued a longitudinal approach tracking various metrics over an eight-week period.²³⁸ Although, on some scales, participants in both the IVE and the traditional condition demonstrated relative parity,²³⁹ researchers reported that the IVE virtual reality condition “did result in more positive, longer-lasting attitudes toward the homeless and significantly more signatures supporting helpful initiatives [for homeless individuals] than did the NPT [traditional narrative-based perspective-taking] condition.”²⁴⁰ This study provides valuable insight into the potential duration of the effects of an IVE experience on attitudes, suggesting that effects can persist for at least eight weeks and be more robust than a traditional perspective-taking approach.²⁴¹

In the second study, which was not longitudinal, the researchers compared four conditions aimed at increasing empathy for the homeless: an information condition in which participants were “solely provided facts about the homeless population”,²⁴² a traditional non-IVE imagine-yourself-becoming-homeless experience; a 2D interactive narrative of becoming homeless on a computer; and the IVE experience of becoming homeless. As in the first study described above, on one or more scales, participants in various non-IVE conditions demonstrated relative parity with participants in the IVE condition.²⁴³ Interestingly, as measured by the proportion of people who signed the petition supporting an initiative helpful to homeless individuals, researchers reported that “there was no significant difference between the Information condition and the VRPT [IVE] condition in the proportion of people who signed the petition[,]”²⁴⁴ although researchers did

235. *Id.* at 10. But see Herrera, *supra* note 18, at 3–4, for a discussion of other studies on disability, stereotypes, and empathy using non-IVE simulations and finding varied results, some increasing empathy but some reinforcing stereotypes and/or augmenting negative attitudes.

236. Herrera et al., *supra* note 18.

237. *Id.* at 5.

238. *Id.* at 5–8.

239. *Id.* at 18–19.

240. *Id.* at 20–21.

241. As is the case for research more generally, the researchers here noted several cautions and limitations, including, *inter alia*, that “attitudes toward the homeless were not measured before the intervention,” and that it will be important to control for user experience level as virtual empathy experiences become more common. *Id.* at 31–32. For a discussion of earlier VR studies and the persistence or lack of persistence of effects over time, see *id.* at 5.

242. *Id.* at 27.

243. *Id.* at 27–28.

244. *Id.* at 27.

report that the information condition “was less effective at making participants feel empathetic and connected to the homeless than any of the perspective-taking conditions.”²⁴⁵ Researchers also reported that, with respect to the IVE experience, as compared to the other two perspective-taking conditions, “[t]he immersive experience of becoming homeless in an IVE resulted in a significantly higher proportion of participants exhibiting helpful behaviors toward the homeless in the form of signing a petition when compared to traditional and less immersive perspective-taking tasks.”²⁴⁶ The results of these studies on empathy and homelessness extend earlier research suggesting that IVEs are generally a more powerful medium than traditional perspective taking for changing behavior. These studies also suggest that, in designing research testing an IVE condition, it will be valuable to include information and control conditions for comparison purposes.²⁴⁷

B. RESEARCH ON AVATARS TO CHANGE BEHAVIOR IN ENVIRONMENTAL CONSERVATION AND EXERCISE

In addition to research specifically on cognitive bias and avatars in the contexts of race, age, disability, and homelessness, empirical studies focus, *inter alia*, on the potency of IVE to modify perspective and behavior more generally in other domains.²⁴⁸ This subsection considers studies on environmental conservation and on exercise that produced positive behavioral effects.

In a pair of experiments, researchers gauged whether an IVE experience would produce a greater impact on environmental conservation than would a traditional education presentation in print and video formats.²⁴⁹ The experiments focused on providing personal experiences of negative environmental consequences to persuade people that their own behaviors directly impact the health of the environment.²⁵⁰ In the first experiment, the researchers used print materials about deforestation and the virtual reality experience of the participant sawing through the trunk of a tree in a forest to provide the experience.²⁵¹ In the print condition of the first experiment, “participants were asked to create a vivid picture in their minds about what they might see, hear, and feel in the forest while reading the detailed print stimulus . . . that depicted the forest, the tree-cutting process, and the silent forest after the tree fell down.”²⁵² Those who participated in the IVE experience held the power saw and cut down the tree in the forest.²⁵³ In this example

245. *Id.*

246. *Id.* at 28.

247. Herrera et al. also note the value of including a “pure control condition” in future studies. *Id.* at 31.

248. *See also, e.g., supra* note 195.

249. Sun Joo (Grace) Ahn, Jeremy N. Bailenson & Dooyeon Park, *Short- and Long-Term Effects of Embodied Experiences in Immersive Virtual Environments on Environmental Locus of Control and Behavior*, 39 COMPUTERS HUM. BEHAV. 235 (2014).

250. *Id.* at 235.

251. *See id.* at 237.

252. *Id.* at 238.

253. *See id.* at 237–38.

of the potential of IVE to affect behavior, the researchers reported that “the personal experience of a future negative consequence—cutting a virtual tree—was sufficiently powerful to encourage individuals to use approximately 20% fewer paper napkins in the physical world compared to individuals who merely read a description about cutting a tree.”²⁵⁴

In the second experiment of the pair, the researchers added a third condition to the print and IVE experiences. In the third condition, in lieu of imagining the forest or experiencing the virtual forest, participants saw a video of the tree-cutting process from the perspective of a camera affixed to a lumberjack who was actually cutting down the tree, providing a first-person perspective with the video displayed on a desktop monitor.²⁵⁵ The researchers found that “[t]he effect of print and video on environmental locus of control and behavior declined over the course of one week whereas the effects of IVEs persisted relatively strongly.”²⁵⁶ This research again suggests that avatars may be more powerful as agents of behavioral change than other less immersive approaches.

Similarly, research on avatars and exercise also suggests that IVEs can be used to encourage desired behavior. “Social cognitive theory describes the power of a model demonstrating a behavior to encourage modeling by an observer.”²⁵⁷ Moreover, when the subject identifies with the model, research suggests that the subject’s propensity to engage in the modeled behavior increases.²⁵⁸ Applied in the IVE context, using digital photographs and other technology, researchers created avatars that looked like each subject.²⁵⁹ In a series of three experiments, the researchers tested whether the subjects who observed avatars that resembled themselves were likely to engage in more exercise than those who observed avatars that did not.²⁶⁰ The researchers “found that simulating positive health results through an avatar similar in appearance to the user increased healthy exercise behaviors over time.”²⁶¹ Modeling in an immersive virtual environment that produces desired behavioral change offers additional possibilities for diminishing error in the *Brady* context.

Research on using digital avatars thus suggests that, in a properly designed experience, these potent immersion opportunities commonly reduced bias and changed participants’ real-world behavior. Moreover, the research above

254. *Id.* at 239.

255. *See id.* at 240.

256. *Id.* at 241–42.

257. Jesse Fox & Jeremy N. Bailenson, *Virtual Self-Modeling: The Effects of Vicarious Reinforcement and Identification on Exercise Behaviors*, 12 MEDIA PSYCHOL. 1, 1 (2009) (first citing ALBERT BANDURA, SOCIAL LEARNING THEORY (1977); and then citing Albert Bandura, *Social Cognitive Theory of Mass Communication*, 3 MEDIA PSYCHOL. 265 (2001)).

258. Fox & Bailenson, *supra* note 257, at 3 (citations omitted).

259. *Id.* at 6.

260. *Id.* at 17. In general, as in other studies, the researchers also note various limitations and caveats. *Id.* at 19–20.

261. Scarborough & Bailenson, *supra* note 22, at 136.

provides evidence that, as a rule, the embodied experience affected participants' behavior to a significantly greater degree than did more traditional perspective-taking approaches.

V. AVATARS AND *BRADY* EVALUATIONS

The U.S. criminal justice system entrusts prosecutors with dual roles, first as seekers of justice and second as advocates. A significant challenge to successfully fulfilling both involves the sometimes contradictory expectations at their intersection. As we learn more about cognitive processes and bias, the challenge, to the extent that prosecutors remain entrusted with both roles, becomes preventing the role of advocate from detrimentally overshadowing the role of justice seeker. Avatars might assist prosecutors to adjust the balance between their two roles in a way that better enables them to perform both successfully.

How might avatars assist prosecutors in making better decisions in the context of *Brady*? At least two types of possibilities surface. First, if an immersive virtual experience could disrupt or modify the Guilt Perspective such that the perspective were not deeply (or as deeply) entrenched, then that might reduce or preempt an ensuing cascade of cognitive biases, like confirmation bias and belief perseverance. Second, virtual reality might function to positively encourage and reinforce prosecutorial decision making that complies with *Brady*.

Much of the experimental research described above on bias and virtual reality involves a participant embodying an avatar to enable the participant to experience the world through specific characteristics of that avatar. The research suggests that this embodiment might enhance self-other overlap and empathy regarding individuals who possess those characteristics. As a result, the participant may harbor lower levels of subsequent explicit or implicit bias towards a real human being who manifests those characteristics.

To fulfill the dual roles required of a genuinely successful prosecutor, a prosecutor has to concurrently hold two potentially inconsistent theories about the defendant in mind: that the defendant is likely guilty (otherwise charges would not have been filed) but may still be innocent (or at least that there may not be adequate admissible evidence to prove guilt). The prosecutor needs to maintain these mental gymnastics throughout the prosecution. A primary impediment to *Brady* disclosure is the personal and office Guilt Perspective or tunnel vision that often develops within the minds of prosecutors and in prosecutors' offices. Prosecutors spend their in-office time with individuals who generally believe that defendants, those who have been charged with crime, are guilty. They spend their in-court time largely advocating in furtherance of and consistent with a Guilt Perspective. Compounding the challenge of an environment that promotes and endorses a Guilt Perspective, it is a fair assumption that most prosecutors have never been charged with serious criminal behavior. As a criminal background investigation is generally a prerequisite to being hired as a prosecutor, it is a

reasonable assumption that few prosecutors are hired who have been charged with or convicted of serious crimes.²⁶² Thus, the prosecutor has likely never personally been in the seat of the accused.

In addition, prosecutors usually lack any opportunity to engage with the accused, except when formally appearing as the advocate against the accused in a courtroom. As a rule, except for statements taken by law enforcement from the accused, the prosecutor will never hear an accused's account of the events unless the accused testifies in court, which happens in a very small percentage of cases.²⁶³ Prosecutors often, therefore, lack a fundamental narrative, uninfluenced by police interrogation, in most case histories.

The in-group for prosecutors embraces their colleagues and the law enforcement officers with whom they work.²⁶⁴ One might even extend the in-group to victims of the charged crimes. Imagining oneself as a crime victim probably falls well within the realm of imagining for a prosecutor. This in-group definition predicts the likely composition of the out-group for prosecutors, namely defendants and perhaps defense attorneys, even though they share the same professional calling.

The theory of a first approach to using avatars would be to create an experiment designed to dislodge the hold of the Guilt Perspective. Based on the embodied perspective-taking research above, the experiment would involve perspective taking focused on generating self-other overlap and empathy by the prosecutor for persons accused of criminal conduct. Such an experiment might include the prosecutor actually becoming a defendant and being treated as a defendant in the virtual space. The avatar could be dressed in a jail-issued orange jumpsuit, just as defendants commonly are in court.²⁶⁵ Measuring whether the avatar experience successfully reduces bias might involve asking participants to complete pre- and post-immersion *Brady* compliance tasks. Non-VR empirical research in the context of *Brady* has employed *Brady* compliance tasks as a metric of prosecutorial error.²⁶⁶ For example, to measure whether study participants engaged in *Brady* error in their role as prosecutors, researchers in a recent study assessed how many of the *Brady*-designated discovery items the participants provided in disclosure to the defense in the mock case task.²⁶⁷ Perhaps a version of such protocols could

262. Prosecutors may, of course, have family members and friends who have been accused of or convicted of serious crimes.

263. Most cases settle in lieu of proceeding to trial, leaving limited opportunities for defendants to tell their account of events in court. See, e.g., *Criminal Cases*, U.S. COURTS, <http://www.uscourts.gov/about-federal-courts/types-cases/criminal-cases> [<https://perma.cc/3WCG-CBLH>] (“More than 90 percent of defendants plead guilty rather than go to trial.”).

264. For a discussion of in-group and out-group dynamics in the context of criminal investigations and prosecutorial decision-making, see SIMON, *supra* note 14, at 28–29.

265. Interview with Professor Emily Murphy, Associate Professor of Law, UC Hastings College of the Law (Winter 2018). The design would also need to be attentive to potential stereotype activation concerns.

266. See REDLICH & LUNA, *supra* note 162.

267. See *id.*

be employed here. Based on the results of the research discussed earlier, this experience could allow prosecutors to engage with the world, at least briefly, as defendants in a deeply immersive experience, and potentially loosen the grip of the Guilt Perspective.²⁶⁸

A second application of immersive virtual environments could involve a more direct function of encouraging and supporting prosecutors in appropriately disclosing *Brady* information. Studies like that of the Fox and Bailenson exercise experiment suggest that avatar experiences could encourage and virtually reward prosecutors for proper *Brady* disclosure. Here, the avatar experience would engage the prosecutor in an avatar that resembles that prosecutor and provide positive reinforcement for disclosing under *Brady*. Although the design of such an experiment, like the one of the prosecutor as the defendant above, requires an investment of much more thought (and consultation with scholars in the field), one could imagine the avatar being recognized at prosecutorial state-wide or national conferences for *Brady* compliance, or for preventing prosecution of persons who are factually innocent.

Other variations of immersive experiences spring to mind as possibilities. For example, in addition to or in lieu of a prosecutor in an embodied experience as a defendant, one could create such an experience with the prosecutor as defense counsel fighting for a client who has been wrongfully convicted due to *Brady* error.²⁶⁹ I imagine those who research in the virtual reality world could envision a host of additional variations to address the concerns underlying *Brady* error.

VI. POTENTIAL BENEFITS & DRAWBACKS TO DIGITAL AVATARS IN THE *BRADY* CONTEXT

Applying a digital avatar approach to preventing *Brady* violations is novel. Consequently, it merits thoughtful evaluation of its most cogent potential benefits and drawbacks.

268. Professor Jeremy Bailenson, who is the founding director of the Virtual Human Interaction Lab at Stanford University, argues that immersive virtual environment experiences should be reserved and used only if at least one of four conditions is met. BAILENSON, *supra* note 20, at 250–53. These conditions are that the experience would be “impossible, dangerous, expensive, or counterproductive” in the real world. *Id.* at 253. Becoming a defendant in a serious real-world criminal case arguably satisfies at least the counterproductive, if not the dangerous, criterion.

269. In commenting on an earlier version of this manuscript, Professor Leonetti suggested a possible variation involving a prosecutor’s avatar having a “negative encounter with a police officer during a Terry stop or arrest.” Carrie Leonetti, Feedback on Manuscript March 16th Version (on file with author). More generally, as suggested by Ms. Salmanowitz in her commentary on a June 2018 draft, one might extend the possibilities of the VR paradigm by focusing on issues of framing and belief perseverance through an initial embodied experience that then is changed to place the prosecutor in the same scenario but through another or opposite lens. Here, the VR experience would aim to address flexibility of thinking and recognition of pre-existing assumptions. E-mail from Natalie Salmanowitz to author (July 3, 2018, 8:57 PM) (on file with author).

A. BENEFITS

Avatars are potent and can be effective agents of behavioral change.²⁷⁰ The research demonstrates that avatars can affect the behavior of participants not only during the experiment but also in the real world subsequent to the experiment.²⁷¹ In the context of racial bias, age discrimination, discrimination against colorblind individuals and against people who are homeless, environmental conservation, and exercise, as the above examples indicate, immersive virtual environments have created behavioral change.²⁷² Depending on the design of the experiment, however, not all of the studies show the change hypothesized or anticipated by the experimenter.²⁷³ This variation suggests that it may take multiple iterations and experiments to design an effective protocol to disrupt a prosecutor's Guilt Perspective appropriately. Moreover, any protocol would, of course, need careful experimental validation before deployment. But, based on research in the field, the potential to create effective self-other overlap and empathy towards an accused lies within the immersive virtual world. Using virtual space to enable a prosecutor to become a defendant may help mitigate or truncate the perception of the defendant as an "out-group" member and reduce the cognitive biases that could cloud prosecutorial *Brady* evaluations, thus encouraging prosecutors to recognize evidence as favorable to the accused and to disclose it.

In addition, not only has the research demonstrated that avatars can effect change, but the research also suggests that avatars are significantly more effective at inducing change than are traditional perspective-taking approaches.²⁷⁴ Avatars also appear to impose less cognitive load than the load imposed by imagining being in the proverbial shoes of another. The research suggests that "[b]ecause they offer a more tangible experience, perspective taking in an immersive virtual environment (IVE) may require less cognitive effort than traditional perspective taking exercises that rely on mental simulation."²⁷⁵

Avatars focus on modifying the perspective of those individuals directly responsible for making the *Brady* call. While external reinforcement may be helpful, in the end, it is most often the prosecutor handling the case who will be in the position to decide whether to disclose evidence favorable to the accused, particularly evidence that might not be well documented. It is the prosecutor handling the case who will need to make the call, often under time constraints and other pressures, about whether evidence meets the *Brady* threshold. Affecting that prosecutor's understanding and inclination to disclose is ground zero in terms of *Brady* compliance. Because it is that prosecutor's perspective that an avatar could

270. See *supra* notes 189–261 and accompanying text.

271. *Id.*

272. *Id.*

273. See, e.g., GROOM ET AL., *supra* note 18.

274. See Ahn et al., *supra* note 19, at 31.

275. Oh et al., *supra* note 17, at 400 (citation omitted).

change, avatars could play a pivotal role in this first line of defense against *Brady* error.

Moreover, beyond *Brady*, state ethics rules commonly demand that prosecutors “shall make timely disclosure to counsel for the defendant . . . the existence of evidence or information known to the prosecutor or other government lawyer that tends to negate the guilt of the accused, mitigate the degree of the offense, or reduce the sentence, except when relieved of this responsibility by a protective order of a tribunal.”²⁷⁶ State rules, like the New York rule quoted here, generally do not anticipate any materiality buffer, thus arguably heightening the importance of the prosecutor’s ability to recognize evidence as favorable to the accused and to disclose it.

In addition to effectiveness, the avatar experience generally contemplates a single immersion session of less than twenty minutes. This could be incorporated into continuing legal education opportunities for experienced prosecutors locally and at state and national conferences and in new prosecutors’ training conferences for those just joining the field. Most of the existing approaches recommended to address *Brady* error attributed to cognitive bias involve much more extensive time commitments. Even if several avatar sessions were required,²⁷⁷ a question that might be studied as part of the design protocol, the total time involved for a prosecutor would be limited. If such immersion makes it easier for a prosecutor to accurately evaluate whether to disclose evidence, that, in and of itself, could represent a more expedient decision and time saved.

A virtual experience also offers a safer environment for trying on other roles. Switching to a defense role contemplates a significant change in mindset for a prosecutor and presumably incurs some mental juggling and a learning curve. Implementing such a switch in the real world with actual defendants is more likely to disadvantage clients as prosecutors shift between perspectives and approaches. Engaging in the avatar experience does not subject real-world defendants to those risks.

The avatar experience is engaging and memorable. Virtual reality experiences are unlike standard lecture training sessions. Their novelty and immersive quality may incline prosecutors toward participation.

Avatars are a potentially mobile and cost-effective approach. Recent research by Professor Bailenson’s team involves an IVE designed to test empathy induction toward homeless individuals.²⁷⁸ He characterizes this as the “‘Empathy at Scale’ project.”²⁷⁹ Bailenson explains that his team has “installed VR systems on the road—our Mobile VR Unit—in museums, near libraries, and at festivals and

276. N.Y. RULES OF PROF’L CONDUCT R. 3.8(b) (2018).

277. For research that considered whether multiple immersions were significant in the context of using avatars to reduce racial bias, see Banakou et al., *supra* note 18, at 3, 7.

278. Herrera et al., *supra* note 18.

279. BAILENSON, *supra* note 20, at 97–99.

fairs to try to get people who are not just the typical college students.”²⁸⁰ He reports that “[a]s of September 2017, [they had] data from over 2,000 subjects.”²⁸¹ Consequently, reaching large numbers of prosecutors at various sites around the country does not seem farfetched.²⁸²

Moreover, in terms of hardware costs, Ms. Salmanowitz’s experiment used the HTC Vive technology, which, by the summer of 2018, listed on Amazon for \$499 per VR system.²⁸³ In addition to a headset and controllers, the experience would also need a powerful graphics computer to run the software, a computer that might cost up to several thousand dollars, as well as some floor space. With respect to software, there may be substantial initial programming costs to design the experience, but VR software design platforms are becoming more user friendly and accessible.²⁸⁴ One such platform, NeuroVR, advertises “a cost-free virtual reality platform based on open-source software, that [provides] the clinical professional with a cost-free VE editor, which allows non-expert users to easily modify a virtual scene, to best suit the needs of the clinical setting.”²⁸⁵ In any event, once designed, the cost of deploying the experience should be fairly modest per prosecutor because the immersive experience should consume twenty minutes or less. Thus, one hardware station could be used by many prosecutors per day. Of course, there is also the cost of each prosecutor’s time. Prosecutors, however, are expected to invest time in professional training, and such a session could count toward that training. With the improvement and accessibility of technology today,²⁸⁶ the immersive program could be made available at sites, like state or national prosecutorial conferences, where many prosecutors could engage with digital avatars. Engaging at a professional conference could also work to prompt discussion and to improve volitional focus on the importance of disclosure.

280. *Id.* at 97.

281. *Id.*

282. *Cf.* Soo Youn Oh, Ketaki Shriram, Bireswar Laha, Shawnee Baughman, Elise Ogle & Jeremy Bailenson, *Immersion at Scale: Researcher’s Guide to Ecologically Valid Mobile Experiments*, Conference Proceedings of IEEE Virtual Reality (VR) (Mar. 19–23, 2016), <https://vhil.stanford.edu/mm/2016/01/oh-vr-immersion-at-scale.pdf> [<https://perma.cc/GK7C-ASJR>] (discussing their “mobile VR project (*Immersion at Scale*) where [they] conduct VR experiment sessions in naturalistic settings (e.g., local events, museums, etc.)” noting that “on average, [they] were able to collect data from 20–25 people for each 4-hour data collection session of *Immersion at Scale*”).

283. *HTC Vive Virtual Reality System*, AMAZON, <https://www.amazon.com/HTC-VIVE-Virtual-Reality-System-pc/dp/B00VF5NT4I?th=1> [<https://perma.cc/CV44-XXB7>]. For a discussion of costs for different types of systems, see TICKNOR, VIRTUAL REALITY AND THE CRIMINAL JUSTICE SYSTEM, *supra* note 195, at 9–17.

284. *See* Ticknor & Tillinghast, *supra* note 195, at 29 (discussing NeuroVR and InWorld Solutions, Inc.); TICKNOR, VIRTUAL REALITY AND THE CRIMINAL JUSTICE SYSTEM, *supra* note 195, at 16–17.

285. NEUROVR 2.0, <http://www.neurovr2.org/> [<https://perma.cc/J8XC-FJA3>].

286. *See* Farmer & Maister, *supra* note 173, at 341 (describing the availability of “several commercial VR systems such as the Oculus Rift, the HTC Vive and the Samsung Gear which are capable of supporting the visual-motor synchrony necessary to allow the experience of embodiment”).

The potential benefits extend beyond *Brady*. Increased self-other overlap and empathy can serve prosecutors more generally in their justice seeking role and navigating their dual roles within constitutional parameters.²⁸⁷

B. DRAWBACKS

While engaging with a digital avatar has myriad potential benefits, it also possesses potential limitations.

First and foremost, an avatar experience might indeed make a prosecutor more empathetic and delay or reduce the entrenchment of a Guilt Perspective. Will that altered perspective mean that prosecutors will lose effectiveness as advocates? When discussing qualities associated with a Guilt Perspective, commentators often quote Herbert Packer's observation that "the operational 'presumption of guilt' . . . allows the fast-paced case screening process in most district attorneys' offices to function."²⁸⁸ Would greater empathy and a less entrenched Guilt Perspective bring evaluations to a halt? To the extent that many prosecutors in cases nationwide fulfill the demands of *Brady* on a regular basis, and the important business of charging and prosecuting cases has not ceased or become appreciably more constrained by their efforts, it is likely that greater empathy and a less rooted Guilt Perspective will not prevent prosecutors from advocating for guilt when that advocacy is appropriate.²⁸⁹

One might even argue that greater empathy may make the process less cumbersome. When the motivation to comply stems from internal understanding of the need to comply, compliance may become more automatic and demand less cognitive effort. Still, it is possible that a more empathetic perspective would result in more agonizing by prosecutors about charging and whether they are providing the requisite discovery. This greater empathy might cause prosecutors to screen differently or more carefully, but such greater care might not result in more time consumption in the long run because less meritorious cases may be screened out earlier. Moreover, in those difficult cases, prosecutors might heed the U.S. Supreme Court's caution to err on the side of disclosure. In addition, in terms of time savings, pre-trial disclosure can save time spent on protracted litigation subsequent to trial and engender appropriate negotiated settlements, not to mention saving the critical human costs of detrimental failure to disclose.

287. For example, enhancing self-other overlap and empathy might incline prosecutors to support alternative approaches to justice, like problem-solving courts and restorative justice.

288. Burke, *Improving*, *supra* note 7, at 1621 (footnote omitted); *see also supra* note 82.

289. Professor Murphy raised another potential drawback. What if the IVE experience is highly effective in the *Brady* context on a case-by-case basis? Could it provide grounds for a post-conviction *Brady* claim against a prosecutor who failed to appropriately disclose and failed to participate in an IVE experience before handling that case? Emily Murphy, Feedback on Manuscript July 16th Version (on file with author). Or, to extend Professor Murphy's inquiry: could an office's failure to provide such experiences on a regular basis furnish grounds for a claim for failure to appropriately train prosecutors on their responsibilities under *Brady*?

A second potential drawback lies in the potency of the immersive experience itself. Manipulation of people's perspectives involves risk. The potential for misuse is substantial. Research tells us that fully immersive experiences can have powerful impacts on people's behavior. The Stanford Prison Experiment offers an important and troubling example. In that experiment, the researchers created an artificial environment in which ordinary undergraduate students played the roles of prison guards and prisoners.²⁹⁰ According to the researchers, the students became so captured by their roles that the experimenters had to call off the experiment only six days into the anticipated two-week process.²⁹¹ The possibility that becoming a virtual defendant could induce some trauma in prosecutors should be considered, and, if such trauma turns out to be a realistic possibility, mitigating and remedial procedures should also be explored.²⁹²

In addition, a virtual reality immersion could encourage individuals to suspend their real-world morality or have a virtual reality amorality carry over into the real world. Consider, for example, concerns about first-person shooter games and their influence on players.²⁹³

290. Social Psychology Network, *The Story: An Overview of the Experiment*, STANFORD PRISON EXPERIMENT, <http://www.prisonexp.org/the-story> [<https://perma.cc/JGT5-39ML>].

291. Social Psychology Network, *Conclusion*, STANFORD PRISON EXPERIMENT, <http://www.prisonexp.org/conclusion> [<https://perma.cc/B2WE-YLR8>]. The Stanford Prison Experiment has been the subject of substantial recent criticism. For examples of those critiques and a response by Professor Zimbardo, who conducted the experiment, see, for example, Ben Blum, *The Lifespan of a Lie*, MEDIUM (June 7, 2018), <https://medium.com/s/trustissues/the-lifespan-of-a-lie-d869212b1f62> [<https://perma.cc/67RD-4TPX>]; Brian Resnick, *The Stanford Prison Experiment Was Massively Influential. We Just Learned it Was a Fraud.*, VOX (June 13, 2018), <https://www.vox.com/platform/amp/2018/6/13/17449118/stanford-prison-experiment-fraud-psychology-replication> [<https://perma.cc/EP5M-U6FV>]; Phillip Zimbardo, *Phillip Zimbardo's Response to Recent Critiques of the Stanford Prison Experiment*, STANFORD PRISON EXPERIMENT, <http://www.prisonexp.org/response/> [<https://perma.cc/Y8JF-VCFW>].

292. Empathy can cause personal distress. See, e.g., Herrera et al., *supra* note 18, at 11 (using a personal distress scale in evaluating empathy for the homeless). Existing scholarship does explore the concept of secondary or vicarious trauma generally for attorneys, including prosecutors and defense counsel who work with traumatized witnesses and clients. See, e.g., Brittany Stringfellow Otey, *Buffering Burnout: Preparing the Online Generation for the Occupational Hazards of the Profession*, 24 S. CAL. INTERDISC. L.J. 147 (2014); Evan R. Seamone, *Sex Crimes Litigation as Hazardous Duty: Practical Tools for Trauma-Exposed Prosecutors, Defense Counsel, and Paralegals*, 11 OHIO ST. J. CRIM. L. 487 (2014).

293. The effects of violent video games have been the subject of substantial scholarly attention and produced conflicting results. Jop de Vrieze, *The Metawars*, 361 SCIENCE 1184 (2018). Compare AM. PSYCHOL. ASS'N, TECHNICAL REPORT ON THE REVIEW OF VIOLENT VIDEO GAME LITERATURE 6, 11 (2015), <http://www.apa.org/pi/families/review-video-games.pdf> [<https://perma.cc/WHS7-9BK5>] (“The link between violent video game exposure and aggressive behavior is one of the most studied and well established” and “[t]he research demonstrates a consistent relation between violent video game use and increases in aggressive behavior, aggressive cognitions, and aggressive affect and decreases in prosocial behavior, empathy, and sensitivity to aggression”), and Craig A. Anderson & Brad J. Bushman, *Effect of Violent Video Games on Aggressive Behavior, Aggressive Cognition, Aggressive Affect, Physiological Arousal, and Prosocial Behavior: A Meta-Analytic Review of the Scientific Literature*, 12 PSYCHOL. SCI. 353, 358 (2001) (“Exposure is positively associated with heightened levels of aggression in young adults and children, in experimental and nonexperimental designs, and in males and females.”), with Christopher John Ferguson, *The Good, The Bad and the Ugly: A Meta-Analytic Review of Positive and Negative Effects of Violent Video Games*, 78 PSYCHIATRIC Q. 309, 314 (2007) (“[T]hese results suggest that violent video game exposure is associated with

Consequently, the type of virtual reality experience proposed here, while not invoking the concerns of the prison environment or first-person shooters, would still need careful attention to design and debriefing of participants. Scholars in the field of virtual reality explain, for example, that “[n]o experiment should be conducted using virtual reality with the foreseeable consequence that it will cause serious or lasting harm to a subject.”²⁹⁴ Or, “virtual reality research should be performed in a beneficent research environment, with the aim of mitigating risks for users of virtual reality.”²⁹⁵ Such research would be subject to review through an Institutional Review Board (IRB) process.

A third potential drawback inquires whether the cognitive bias that may cascade from an entrenched Guilt Perspective is substantially different from the biases that the IVE research thus far has investigated. It may be that the racial or age biases, for example, are different from the confirmation and related information distorting biases that the *Brady* research would aim to reduce. The question then becomes whether the existing research would apply to the *Brady* context. To the extent that the goal of the *Brady* research involves empathy and self-other overlap from an in-group member (prosecutor) toward an out-group member (defendant), the focus on dislodging or modifying the in-group bias is quite similar to the approach of much of the existing research. If the experimental protocol successfully creates prosecutorial empathy (for defendants) and self-other overlap, the perspective-taking research suggests a likely reduction in the biases that might otherwise ensue. Thus, the general approach should apply to the in-group, out-group dynamic in the proposed research. Of course, in the end, we will need to conduct the research to see whether the theory is borne out in practice.

Immersive virtual reality has become much more accessible, with the commercial production of tools like the Oculus Rift, HTC Vive, and the Samsung Gear.²⁹⁶ Researchers have, therefore, expressed concern that “IVEs may lose their power once they become an everyday experience.”²⁹⁷ This fourth drawback may undermine future research with IVEs. To the extent, however, that prosecutors have not yet become regular participants in those experiences, there remains a window before that concern undermines the possibility of effective IVE intervention.

A fifth potential drawback involves the duration of the modified behavior. Will the enhanced empathy and changed behaviors last? While some research indicates that effects do endure for at least some period of time beyond the initial experience,²⁹⁸ more research on this question will be valuable. Similarly, although

some positive effects, but does not appear to be associated with negative effects in relation to aggressive behavior.”).

294. Parsons et al., *supra* note 18, at 13 (citation omitted).

295. *Id.*

296. See Farmer & Maister, *supra* note 173, at 341.

297. Oh et al., *supra* note 17, at 407.

298. Farmer & Maister, *supra* note 173, at 342; Herrera et al., *supra* note 18, at 19 (measuring impact through study period of two months post-immersion).

single session immersion has been effective in a number of studies on avatars to reduce cognitive bias,²⁹⁹ it would be valuable to test whether a single session will be sufficient or whether multiple sessions would be necessary or enhance the anticipated effects in the *Brady* context.³⁰⁰ Designing and implementing experiments in the proposed research that test the duration of effects and the appropriate number of sessions could help provide more definitive responses on these issues.

Sixth, specifically with respect to a virtual reality experience in which a prosecutor is rewarded for effective *Brady* compliance, will such an experience be discordant with the lived reality of prosecutors? From her survey, Professor Yaroshefsky noted that “[n]one of the offices we interviewed have mechanisms in place to reward good disclosure practices and some have a culture that affirmatively discourages good disclosure practices.”³⁰¹ Would experiencing such a virtual world make prosecutors feel disconnected from the real one? Here is an opportunity for life to imitate art. Having supervisors and administrative personnel who make office policy personally participate in the IVE opportunity might encourage greater real-world recognition of prosecutors who fulfill *Brady*’s and state ethics rules’ dictates.³⁰²

Seventh, some commentators may be concerned that the immersive virtual experience might just make the prosecutor a better chess player, anticipating the moves of defense counsel. While this is possible, it seems unlikely that an experience focused on inducing empathy and self-other overlap would promote such Machiavellian strategies.³⁰³

Eighth, for some individuals, engaging with virtual reality equipment can cause uncomfortable physical symptoms, like motion sickness or eye strain.³⁰⁴ Hence, the design of the protocol should seek to evaluate and mitigate these effects.

Finally, will prosecutors be willing to engage? That will depend first on demonstrating the worth of the experience. If the anticipated research suggests that an immersive virtual experience can appropriately enable prosecutors to more effectively navigate their dual roles in the context of *Brady* compliance, the next step

299. See, e.g., Peck et al., *supra* note 19.

300. For research that considered whether multiple immersions were significant in the context of using avatars to reduce racial bias, see Banakou et al., *supra* note 18, at 3, 7.

301. Yaroshefsky, *supra* note 7.

302. Research suggests that even open-file policies may not be enough to address the concerns *Brady* was designed to alleviate, see Grunwald, *supra* note 77, at 771, 826, but that concern is beyond the scope of this Article.

303. In designing the experiment, we will also have to be conscious of the risk of social desirability effects, efforts of the participants to deliver results that they perceive as positively correlated with socially acceptable responses (and perhaps those that participants anticipate that the researchers are seeking). Cf. Salmanowitz, *Impact of Virtual Reality*, *supra* note 26, at 178.

304. BAILENSON, *supra* note 20, at 9, 253–54 (discussing “simulator sickness”); see also Ticknor & Tillinghast, *supra* note 195, at 31 (discussing several symptoms associated with “cybersickness” including “headache, paleness, sweating, dryness of mouth, disorientation, and vertigo” and suggesting screening protocol for study participants). Professor Bailenson also enumerates drawbacks to virtual reality more generally. BAILENSON, *supra* note 20, at 250–58.

will involve advocacy. It will be up to all of us, individually and collectively, within and without prosecutors' offices, to encourage prosecutors to engage with the research. More established institutional or organizational incentives might also play a role. Lobbying prosecutorial organizations to encourage participation and to fund travel to training sites might also increase engagement. Modest bonuses, like an extra vacation day, for prosecutors who engage in the virtual reality immersion could also enhance participation.³⁰⁵

CONCLUSION

Prosecutorial failure to disclose evidence favorable to the accused under *Brady* imperils justice and has caused lifetimes of harm. Scholars attribute much of this failure to cognitive biases that can cloud a prosecutor's thinking process once a Guilt Perspective takes root in a prosecutor's mind. Research has demonstrated that perspective taking can modify a participant's viewpoint and mitigate cognitive bias. Digital avatars represent a particularly potent approach to perspective taking. They hold much promise as a method to disrupt the Guilt Perspective so that prosecutors will be better able to appreciate evidence as favorable to the accused and be inclined to disclose such evidence in a criminal case. Whether that promise can be realized involves designing and implementing research to test the relevant hypothesis: that an immersive experience can dislodge or delay entrenchment of a Guilt Perspective and enhance prosecutorial recognition of evidence that is favorable to the accused and encourage prosecutors to disclose that evidence.

The analysis in this Article distilled at least three approaches to experimental design. First, to enhance self-other overlap and empathy generation as an antidote to a too-firmly-entrenched Guilt Perspective, one approach might embody the prosecutor in a "defendant" avatar. A second could place the prosecutor in a defense counsel avatar. Third, if a virtual reward condition might motivate prosecutors to divulge *Brady* material, an experiment to encourage that behavior could also be developed. For each of these, a number of components of the protocols of the IVE research described above could be modified to provide the basic foundation for an immersive environment that enabled a prosecutor to experience the world as a person accused of crime or as defense counsel or to be rewarded for appropriate *Brady* disclosure. Unlike for race and age studies, instead of using the IAT, evaluation of successful reduction of cognitive biases might involve pre- and post-immersion *Brady* compliance tasks. Designing appropriate research protocols represents the next challenge in this endeavor to harness the power of digital avatars to reduce *Brady* error injustice.

305. For a discussion more generally of the possibility of financial incentives to encourage *Brady* disclosure, see Tracey L. Meares, *Rewards for Good Behavior: Influencing Prosecutorial Discretion and Conduct with Financial Incentives*, 64 *FORDHAM L. REV.* 851, 910 (1995) ("A prosecutor would receive a reward for proper behavior only if a reviewing court finds that the prosecution did not fail to turn over evidence that was favorable to the defense, whether or not the reviewing court ultimately finds that the favorable evidence was material.").