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## Neuroscience, Artificial Intelligence, and the Case Against Solitary Confinement

Francis X. Shen

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# Neuroscience, Artificial Intelligence, and the Case Against Solitary Confinement

Francis X. Shen\*

## ABSTRACT

*Prolonged solitary confinement remains in widespread use in the United States despite many legal challenges. A difficulty when making the legal case against solitary confinement is proffering sufficiently systematic and precise evidence of the detrimental effects of the practice on inmates' mental health. Given this need for further evidence, this Article explores how neuroscience and artificial intelligence (AI) might provide new evidence of the effects of solitary confinement on the human brain.*

*This Article argues that both neuroscience and AI are promising in their potential ability to present courts with new types of evidence on the effects of solitary confinement on inmates' brain circuitry. But at present, neither field has collected the type of evidence that is likely to tip the scales against solitary confinement and end the practice. This Article concludes that ending the entrenched practice of solitary confinement will likely require both traditional and novel forms of evidence.*

*In exploring the potential effects of neuroscientific evidence on support for solitary confinement, the Article reports results from an*

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*original online experiment with a group of 250 ideologically conservative participants. The analysis finds that the introduction of brain injury reduced conservatives' support for solitary confinement but not to the extent that is likely to make a policy impact. The Article argues that future, more individualized brain evidence may be of greater use, but at present neuroscience is limited in its ability to systematically measure the brain changes that inmates experience in solitary confinement.*

*This Article then turns to AI and argues that it could be developed to provide litigators and inmates with the ability to more effectively document the detrimental effects of solitary confinement. Looking to the future, the Article lays out a vision for an AI system called "Helios," named after the Homeric sun god believed to see and hear everything. The Article envisions Helios as a self-learning AI system with a mission to help inmates and their attorneys gather more systematic evidence of the effects of solitary confinement on inmate health. Helios is also a platform on which additional inmate services might one day be provided. The Article describes how Helios must be carefully designed, with particular attention given to privacy concerns.*

*This Article is organized in seven parts. Part I describes the historical and contemporary use of solitary confinement in the United States, highlighting the known effects of solitary confinement on inmates. Part II summarizes recent constitutional challenges to the practice of solitary confinement. Part III explores the potential for integrating neuroscientific evidence into these legal challenges to solitary confinement. Part IV discusses a new online experiment to explore whether neuroscience might change public opinion on solitary confinement. In Part V, the Article transitions to a consideration of AI. The Article proposes a self-learning system, Helios, and describes how the system would operate. Part VI turns to a series of challenging ethical and legal questions about the design and implementation of Helios. Part VII briefly concludes.*

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I. INTRODUCTION

*“Prisoners are shut away—out of sight, out of mind.”*  
—Supreme Court Justice Anthony Kennedy (2015)<sup>1</sup>

*“After only a short time in solitary, I felt all of my senses start to diminish. . . . I stared obsessively at the bolts on the door to my cell. There was nothing to hear except empty, echoing voices from other parts of the prison. I was so lonely that I hallucinated words coming out of the wind. . . . Who would know if something happened to me? The space I inhabited was invisible to the outside world, just like I was.”*  
—Five Mualimm-ak, solitary confinement inmate (2016)<sup>2</sup>

After considering the first-person accounts of inmates such as Five Mualimm-ak quoted in the epigraph, the dehumanizing effects of solitary confinement may seem self-evident. But for successful litigation, courts require concrete evidence of the effects of solitary confinement on inmates. Such evidence is often difficult to gather, and this evidentiary gap is one of the limiting factors in efforts to end the practice. Despite many reform efforts in both courts and legislatures, solitary confinement persists in the United States, with over 80,000 inmates experiencing solitary confinement each year.<sup>3</sup>

This Article explores how new types of evidence from neuroscience and artificial intelligence (AI) might contribute to debates and litigation over solitary confinement. The use of neuroscientific

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1. Davis v. Ayala, 135 S. Ct. 2187, 2209 (2015) (Kennedy, J., concurring).

2. Five Mualimm-ak, *Invisible, in HELL IS A VERY SMALL PLACE: VOICES FROM SOLITARY CONFINEMENT* 147, 148 (Jean Casella et al. eds., 2016).

3. See David H. Cloud et al., *Public Health and Solitary Confinement in the United States*, 105 AM. J. PUB. HEALTH 18, 18–20 (2015) (“In some jurisdictions, assignment to administrative segregation is based solely on a point system that includes factors such as tattoos, known associates, and possessions suggesting gang affiliation, without regard to individual behaviors.”).

evidence in court has steadily increased over the past decade,<sup>4</sup> and litigators are already citing to brain evidence in constitutional challenges to solitary confinement.<sup>5</sup>

This Article reviews the use of neuroscience in those cases and examines how neuroscience might persuade supporters of solitary confinement to change their views. Based on review of the cases and a new experimental study examining the effect of neuroscience on conservative subjects' support for solitary confinement, it appears that, at present, the addition of neuroscientific evidence is unlikely to be sufficient to tip the scales against solitary confinement in either courts or the court of public opinion.

Thinking further about the potential of new technology to produce novel evidence relevant to solitary confinement, the Article next offers an extended thought experiment on the possibilities for AI to collect new, more systematic data on the harms of solitary confinement. The Article argues that AI can, and should, be developed to provide inmates with better documentation of the harms they experience. For instance, AI can develop detailed minute-by-minute records of an inmate's psychological experiences or a guard's abusive behavior. Moreover, AI could collect this evidence across many hundreds, or even thousands, of inmates in solitary. Collectively, and combined with neuroscientific evidence as framework evidence, this type of novel and comprehensive evidence might significantly bolster both individual and class-based legal claims challenging solitary confinement.

Such an AI system, of course, does not yet exist. The Article thus presents a vision for an AI system named "Helios" after the Homeric god believed to see and hear everything.<sup>6</sup> Helios is envisioned as a self-learning AI system with a mission to gather more systematic evidence of the effects of solitary confinement on inmate health. Helios is also a

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4. See Paul Catley & Lisa Claydon, *The Use of Neuroscientific Evidence in the Courtroom by Those Accused of Criminal Offenses in England and Wales*, 2 J.L. & BIOSCIENCES 510, 510 (2015); Jennifer A. Chandler, *The Use of Neuroscientific Evidence in Canadian Criminal Proceedings*, 2 J.L. & BIOSCIENCES 550, 550 (2015); Deborah W. Denno, *Courts' Increasing Consideration of Behavioral Genetics Evidence in Criminal Cases: Results of a Longitudinal Study*, 2011 MICH. ST. L. REV. 967, 970–71 (2011); Nita A. Farahany, *Neuroscience and Behavioral Genetics in US Criminal Law: An Empirical Analysis*, 2 J.L. & BIOSCIENCES 485, 485 (2015); Lyn M. Gaudet & Gary E. Marchant, *Under the Radar: Neuroimaging Evidence in the Criminal Courtroom*, 64 DRAKE L. REV. 577, 578–79 (2016); C.H. de Kogel & E.J.M.C. Westgeest, *Neuroscientific and Behavioral Genetic Information in Criminal Cases in the Netherlands*, 2 J.L. & BIOSCIENCES 580, 580 (2015).

5. See *infra* Part III.

6. See Adalaide Morris, *Reading H.D.'s "Helios and Athene"*, 12 IOWA REV. 155, 158 (1981).

platform on which additional inmate services might one day be provided. Helios will communicate via voice technology with inmates, engaging in and learning from potentially thousands of conversations every day. Helios must be carefully designed, as outlined in the discussion to follow.

In most potential legal applications of AI, the relevant cost-benefit question is: Can nonhuman AI do the task better than a human? For example, in the criminal sentencing context, is AI-prediction of future dangerousness better than human prediction of future dangerousness?<sup>7</sup> In that context, relying solely on an algorithm makes sense only if the algorithm is better than what the human can do.

But here, the question is not AI versus humans. Human lawyers will still be bringing challenges against solitary confinement, and human experts will still be documenting confinement conditions and talking with inmates to document first person experiences. AI in this context is not meant to supplant, but instead to support, the work of humans. Just as oceanographers are developing underwater AI to explore the world's deepest trenches where no humans can go,<sup>8</sup> solitary confinement reformers can work to develop AI to be present in the solitary confinement environment in ways that no human can. Helios is not replacing a human, but rather intervening where no other humans are allowed to be.

The uniquely barbaric practice of solitary confinement provides a uniquely productive opportunity for AI. There are, of course, a host of serious concerns, including privacy, co-opting by the government, and the machine ethics of Helios. This Article addresses these concerns and ultimately concludes that the promise of Helios outweighs the perils.

Moreover, there may be a moral imperative for AI to at least explore a solution. Super-maximum security ("supermax") prisons aim to completely deprive inmates of sensory inputs.<sup>9</sup> For instance, the Alpha Unit cells at a Wisconsin Supermax prison have the following architectural feature:

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7. For discussion, see Alyssa M. Carlson, Note, *The Need for Transparency in the Age of Predictive Sentencing Algorithms*, 103 IOWA L. REV. 303, 304–06 (2017).

8. See Timm Schoening, Kevin Köser & Jens Greinert, *An Acquisition, Curation and Management Workflow for Sustainable, Terabyte-Scale Marine Image Analysis*, 5 SCI. DATA 180181, at 2 (Aug. 2018); Schmidt Ocean Institute, *Artificial Intelligence Guides Rapid Data-Driven Exploration of Underwater Habitats*, PHYS.ORG (Aug. 30, 2018), <https://phys.org/news/2018-08-artificial-intelligence-rapid-data-driven-exploration.html> [<https://perma.cc/VZ23-S99M>].

9. See *Jones 'El v. Berge*, 164 F. Supp. 2d 1096, 1117 (W.D. Wis. 2001); TERRY ALLEN KUPERS, *SOLITARY: THE INSIDE STORY OF SUPERMAX ISOLATION AND HOW WE CAN ABOLISH IT* 27 (2017) (noting that Kupers was able to visit the prison only due to a lawsuit alleging that the conditions were unconstitutional).

[C]ells did not open onto the hallway where officers would move about; instead, pairs of cells opened onto a small chamber that was separated from the hallway by another door, so that the inhabitants of those cells would not even have the experience of seeing officers walk up and down the hallway across from their cell.<sup>10</sup>

These humans see and speak with no one for twenty-three hours a day.<sup>11</sup> In the face of such dehumanization, and given that constitutional challenges remain so difficult to win, it is at least worth discussing whether there is a role for AI to produce new evidence of this practice.

The Article is organized in seven parts. In Part I, the Article describes the historical and contemporary use of solitary confinement in the United States, and also discusses the known effects of solitary on inmates. In Part II, the Article examines constitutional challenges and policy advocacy to curtail the practice of prolonged solitary confinement. In Part III, the Article examines the use of neuroscience in solitary confinement litigation, and Part IV explores whether neuroscience might affect public support for solitary confinement. Part V transitions to AI, and proposes a self-learning system called “Helios.” This Part describes how the system would operate and its potential applications. Part VI turns to a series of challenging ethical and legal questions about the design and implementation of Helios. Part VII briefly concludes.

## II. SOLITARY CONFINEMENT IN THE UNITED STATES

In the early nineteenth century, solitary confinement in the United States was designed primarily for rehabilitative purposes.<sup>12</sup> An emphasis on silence was thought to give the prisoners a better chance at redemption because they would be less tempted by the words of their fellow inmates.<sup>13</sup> Time alone meant more time with God, which was thought to lead to redemption.<sup>14</sup>

While its origins may have been rooted in rehabilitation, psychiatrist Terry Kupers—who has worked extensively with inmates

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10. KUPERS, *supra* note 9, at 27.

11. *See id.* at 25.

12. *See* LAWRENCE M. FRIEDMAN, CRIME AND PUNISHMENT IN AMERICAN HISTORY 78 (1993); David J. Rothman, *Perfecting the Prison: United States, 1789–1865*, in THE OXFORD HISTORY OF THE PRISON: THE PRACTICE OF PUNISHMENT IN WESTERN SOCIETY 100, 116–24 (Norval Morris & David J. Rothman eds., 1998); Muriel Schmid, “The Eye of God”: Religious Beliefs and Punishment in Early Nineteenth-Century Prison Reform, 59 THEOLOGY TODAY 546, 548 (2003); *see also In re Medley*, 134 U.S. 160, 167–68 (1890) (discussing the “very interesting history” of solitary confinement).

13. *See* Schmid, *supra* note 12, at 549–50.

14. *See* FRIEDMAN, *supra* note 12, at 79; Rothman, *supra* note 12, at 118; Daniel Brook, *A History of Hard Time*, LEGAL AFF., Jan.–Feb. 2003, at 39–40.



in solitary—notes that “[t]oday solitary confinement has entirely lost its claims of rehabilitative purpose and has become merely a means of enforcing discipline and removing from the general prison population inmates considered to be dangerous or in any way problematic.”<sup>15</sup> Through soundproofed, windowless, and “self-contained” cells, modern solitary confinement cells are designed for prolonged isolation and sensory deprivation.<sup>16</sup> Section II.A describes how solitary is used and justified in the modern system. Section II.B reviews what is known about the effects of solitary confinement on inmates.

### *A. How Is Solitary Confinement Used and How Is It Justified?*

Inmates may find themselves segregated from the rest of the prison population for one of three primary reasons: disciplinary segregation, protective custody, or administrative segregation.<sup>17</sup>

*Disciplinary segregation.* This form of segregation is utilized as a response to some inmate rules infractions. Prisons have a number of rules for inmates, and inmates who violate those rules are subject to discipline.<sup>18</sup> There are constitutional limitations to the discipline that prisons can administer.<sup>19</sup> Moreover, prisons are required to provide some—though not all—due process rights to inmates charged with prison misconduct.<sup>20</sup> There remains “limited research concerning the factors that influence disciplinary decision-making” in prisons.<sup>21</sup> The

15. KUPERS, *supra* note 9, at 23.

16. See SHARON SHALEV, SUPERMAX: CONTROLLING RISK THROUGH SOLITARY CONFINEMENT 134–37 (2013) (“The design of supermax prisons sets in stone very extreme conditions of confinement.”); SHARON SHALEV, A SOURCEBOOK ON SOLITARY CONFINEMENT 39 (2008) (“Newly built isolation units tend to adopt the ‘small pod’ design where cells are grouped together[,] . . . arranged around a centralised control room from which prisoners are supervised. These units are designed to increase surveillance and to enable prolonged solitary confinement and minimise contact between prisoners and staff.”); Shruti Ravindran, *Twilight in the Box*, AEON (Feb. 27, 2014), <https://aeon.co/essays/this-is-what-solitary-confinement-does-to-the-brain>.

17. See Holly A. Miller & Glenn R. Young, *Prison Segregation: Administrative Detention Remedy or Mental Health Problem?*, 7 CRIM. BEHAV. & MENTAL HEALTH 85, 86 (1997). For a detailed and revealing discussion of various segregation policies as they are put into practice, see KITTY CALAVITA & VALERIE JENNESS, *APPEALING TO JUSTICE: PRISONER GRIEVANCES, RIGHTS, AND CARCERAL LOGIC* 66, 86, 115, 147 (2014) (using data from the California prison system to examine prisoner grievances and institutional response).

18. See Christopher Howard et al., *Processing Inmate Disciplinary Infractions in a Federal Correctional Institution: Legal and Extralegal Correlates of Prison-Based Legal Decisions*, 74 PRISON J. 5, 7 (1994).

19. See *infra* Part III.

20. See *Wilkinson v. Austin*, 545 U.S. 209, 210–11 (2005); *Wolff v. McDonnell*, 418 U.S. 539, 540, 556 (1974).

21. H. Daniel Butler & Benjamin Steiner, *Examining the Use of Disciplinary Segregation Within and Across Prisons*, 34 JUST. Q. 248, 251 (2017).

primary justifications for using disciplinary segregation are violence reduction—for both the confined inmate and the other inmates—and punishment for rule violations.<sup>22</sup>

The utilitarian deterrence justification offered for disciplinary segregation is that spending time in solitary confinement is thought to make it less likely for an individual to offend again, and seeing someone spend time in solitary might have a general deterrence effect on other inmates.<sup>23</sup> Proponents of disciplinary segregation argue that solitary confinement as a mode of punishment “leads to effective prison management because [it] curb[s] violence and disturbances within penal institutions.”<sup>24</sup> Studies show that prison wardens generally agree with the notion that solitary confinement “serve[s] to increase system-wide safety, order, and control of the general prison population” and deters potentially disruptive inmates, including “gang members” and “inmates who endanger prisoners and correctional staff.”<sup>25</sup>

*Protective custody.* This type of isolation is utilized to provide safety for prisoners believed to be at risk in the general prison population.<sup>26</sup> Historically, prisoners selected for protective custody fall into one of two categories: (1) those who have provided information about rule violations committed by other inmates and (2) those with characteristics—sexual,<sup>27</sup> cognitive,<sup>28</sup> or otherwise—that increase the likelihood of abuse by other inmates.<sup>29</sup> The isolation of a vulnerable inmate may be voluntary or involuntary,<sup>30</sup> although the extent of

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22. See Chad S. Briggs et al., *The Effect of Supermaximum Security Prisons on Aggregate Levels of Institutional Violence*, 41 CRIMINOLOGY 1341, 1346–47 (2003); Angela Browne et al., *Prisons Within Prisons: The Use of Segregation in the United States*, 24 FED. SENT’G REP. 46, 47 (2011); Jerry R. DeMaio, *If You Build It, They Will Come: The Threat of Overclassification in Wisconsin’s Supermax Prison*, 2001 WIS. L. REV. 207, 211 (2001) (“[S]eparation of prisoners from the general population has long been used to deter, prevent, and punish violent and disruptive behavior in a prison population—a population where many members have already shown themselves to be prone to violence.”).

23. See Briggs et al., *supra* note 22, at 1345; DeMaio, *supra* note 22, at 211.

24. Jesenia M. Pizarro & Raymund E. Narag, *Supermax Prisons: What We Know, What We Do Not Know, and Where We Are Going*, 88 PRISON J. 23, 29 (2008).

25. *Id.*

26. See Browne et al., *supra* note 22, at 47.

27. See Cyrus Ahalt & Brie Williams, *Reforming Solitary-Confinement Policy—Heeding a Presidential Call to Action*, 374 NEW ENG. J. MED. 1704, 1704 (2016) (describing lesbian, gay, bisexual, transsexual, or intersex inmates as candidates for protective custody).

28. See U.S. DEP’T OF JUSTICE, EXEC. OFFICE OF THE PRESIDENT, REPORT AND RECOMMENDATIONS CONCERNING THE USE OF RESTRICTIVE HOUSING 46–52 (2016).

29. See Browne et al., *supra* note 22, at 47.

30. See U.S. DEP’T OF JUSTICE, *supra* note 28, at 23. As the Department of Justice points out, “[m]ost inmates in protective custody voluntarily seek removal from the general population; in a minority of cases, Bureau staff will involuntarily commit an inmate who is unable or unwilling to seek appropriate protection.” *Id.*

isolation for those in protective custody can be just as severe as for those segregated for other reasons.<sup>31</sup>

Protective custody recognizes that certain characteristics expose inmates to greater danger than others.<sup>32</sup> Advocates of protective custody argue that prison administrators are in the best position to ensure the safety of inmates, and that protection of the vulnerable, especially when there are relatively few, is an effective way to minimize prison violence.<sup>33</sup>

*Administrative segregation.* Administrative segregation is used to remove a prisoner from the prison population when the continued presence of the inmate would pose “a serious threat to life, property, self, staff or other inmates, or to the security or orderly running of the institution.”<sup>34</sup> In theory, administrative segregation is not intended to be punitive,<sup>35</sup> but it has been criticized because it seems to be used disproportionately—and inappropriately—for inmates with mental illness.<sup>36</sup> Further, unlike disciplinary detention, administrative segregation is indefinite in duration.<sup>37</sup> As long as a prisoner remains a threat to the security or orderly function of the institution, he or she may be kept separate.<sup>38</sup> Proponents of administrative segregation argue that, in some circumstances, the shared benefit of separating a volatile individual from the prison population outweighs the costs imposed upon the individual, as grave as they may be.<sup>39</sup>

31. See Browne et al., *supra* note 22, at 47 (“[R]estrictions on human contact and programming for prisoners in protective custody can be as severe as for prisoners.”).

32. See Richard C. McCorkle, *Personal Precautions to Violence in Prison*, 19 CRIM. JUST. & BEHAV. 160, 161–62, 170 (1992).

33. See Paul Gendreau et al., *Protective Custody: The Emerging Crisis Within Our Prisons?*, 49 FED. PROB. 55, 56–57 (1985).

34. Jon Marc Taylor, *The Politicization of the Hole in Indiana and Missouri*, in THE MARION EXPERIMENT: LONG-TERM SOLITARY CONFINEMENT AND THE SUPERMAX MOVEMENT 21, 37 (Stephen C. Richards ed., 2015).

35. See Maureen L. O’Keefe, *Administrative Segregation from Within: A Corrections Perspective*, 88 PRISON J. 123, 123 (2008).

36. See Maureen L. O’Keefe, *Administrative Segregation for Mentally Ill Inmates*, 45 J. OFFENDER REHABILITATION 149, 149 (2007). There are many other concerns about its implementation, as explored by KERAMET REITER, 23/7: PELICAN BAY PRISON AND THE RISE OF LONG-TERM SOLITARY CONFINEMENT (2016).

37. See NATASHA A. FROST & CARLOS E. MONTEIRO, U.S. DEPT OF JUSTICE, NAT’L INST. OF JUSTICE, ADMINISTRATIVE SEGREGATION IN U.S. PRISONS 5 (2016).

38. See Cloud et al., *supra* note 3, at 18, 20 (“In some jurisdictions, assignment to administrative segregation is based solely on a point system that includes factors such as tattoos, known associates, and possessions suggesting gang affiliation, without regard to individual behaviors.”).

39. See Pizarro & Narag, *supra* note 24, at 30–31 (“[Studies] show that inmates placed in an environment as stressful as that of a supermax prison begin to lose touch with reality and exhibit

There are, at least in theory, guiding principles by which prison officials are meant to abide when administering segregation.<sup>40</sup> For example, prison officials must periodically assess the mental and physical health of inmates confined in solitary units.<sup>41</sup> However, officials have significant personal discretion in regards to the placement of inmates in disciplinary or administrative segregation, the length in which the inmate is confined, and the privileges bestowed upon the inmate while confined.<sup>42</sup> When an inmate voluntarily seeks protective custody, prison officials should seek out alternatives to solitary confinement. If, however, placement in solitary confinement is unavoidable, officials should place individuals requesting protection in separate housing with less severe isolation.<sup>43</sup>

This brief review of the three rationales for solitary confinement—disciplinary segregation, protective custody, and administrative segregation—suggests that all three rationales can lead to isolating conditions for inmates.<sup>44</sup> The next Section reviews what is known about the effects of such isolation on humans.

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symptoms of psychiatric decomposition, including difficulty concentrating, heightened anxiety, intermittent disorientation, and a tendency to strike out at people.”).

40. For instance, in the federal system, the “disciplinary system resembles the stages of a criminal proceeding: after officers learn of an alleged violation, Bureau officials investigate the matter, conduct a factual hearing to determine responsibility, and then impose a penalty on those deemed responsible.” U.S. DEPT OF JUSTICE, *supra* note 28, at 18. For an in-depth description of the punishment rating process, see Taylor, *supra* note 34, at 40, 44–46 (“There are four categories: greatest, high, moderate, and low moderate. The 100 series and 200 series shots [i.e., incident reports] are the most severe. Usually, if you receive one of them, you go right to the hole to await a [Discipline Hearing Officer] hearing. These shots carry the highest sanctions and sometimes can lead to street charges, which means new federal indictments. . . . The 300 and 400 series shots are less severe and often don’t necessitate hole time unless there are repeated violations.”).

41. See U.S. DEPT OF JUSTICE, *supra* note 28, at 18. While state prison practices vary widely, the Bureau of Prisons has established a standard review process for every inmate in administrative detention. At “SHU Weekly Review,” the warden and an interdisciplinary team of prison officials review each inmate’s case individually “to ensure all staff are aware of the inmate’s status, proposed plan of action, recommendation for transfer or reintegration into the general population, discipline status, and a review of their current behavior as well as physical and mental health.” *Id.*

42. *Id.* at 20.

43. See *id.* at 23 (“[M]ost inmates in protective custody voluntarily seek removal from the general population. . . . In addition, a small number of inmates report a preference for solitary housing and will occasionally request protective custody to avoid residing in the general population. To limit long-term placement in protective custody, Bureau staff will often transfer inmates out of the institution where the threat exists, either to the general population of another facility or to a special-purpose institution that houses similarly situated inmates under less restrictive conditions.”).

44. See Alison Liebling, *Prison Officers, Policing and the Use of Discretion*, 4 THEORETICAL CRIMINOLOGY 333, 333, 341 (2000).

### *B. Effects of Solitary Confinement*

A recent review of research on solitary confinement concludes that “[a]lthough incomplete, the growing body of literature largely supports early findings suggesting that solitary confinement, particularly for protracted periods of time, is detrimental to prisoners’ overall well-being.”<sup>45</sup> This Section reviews some of the pertinent findings on the effects of the conditions of solitary confinement.

#### 1. Effect of Social Isolation on Humans

A discussion of the effects of solitary confinement on humans necessarily starts with a contextual note about humans’ need for social connectedness. Humans evolutionarily differ from other species in their reliance on “social living,” which includes “learning by social observation”; “navigating complex social hierarchies, social norms, and cultural developments”; and “orchestrating relationships, ranging from pair bonds and families to friends, bands, and coalitions.”<sup>46</sup> Given this need for intense social relationships, it is perhaps not surprising to find that high levels of perceived loneliness are associated with increased morbidity and mortality,<sup>47</sup> feelings of sadness and depression,<sup>48</sup> increased vascular resistance and higher blood pressure,<sup>49</sup> disrupted

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45. Bruce A. Arrigo & Heather Y. Bersot, *Revisiting the Mental Health Effects of Solitary Confinement on Prisoners in Supermax Units: A Psychological Jurisprudence Perspective*, in *THE MARION EXPERIMENT: LONG-TERM SOLITARY CONFINEMENT AND THE SUPERMAX MOVEMENT* 151, 151 (Stephen C. Richards ed., 2015).

46. John T. Cacioppo & Stephanie Cacioppo, *Social Relationships and Health: The Toxic Effects of Perceived Social Isolation*, 8 SOC. & PERSONALITY PSYCHOL. COMPASS 58, 58–59 (2014).

47. See *id.* at 58; Julianne Holt-Lunstad et al., *Social Relationships and Mortality Risk: A Meta-Analytic Review*, 7 PLOS MED. e1000316, at 2 (2010).

48. See John T. Cacioppo et al., *Perceived Social Isolation Makes Me Sad: 5-Year Cross-Lagged Analyses of Loneliness and Depressive Symptomatology in the Chicago Health, Aging, and Social Relations Study*, 25 PSYCHOL. & AGING 453, 453 (2010).

49. See John T. Cacioppo et al., *Loneliness and Health: Potential Mechanisms*, 64 PSYCHOSOMATIC MED. 407, 407 (2002); Louise C. Hawkey et al., *Loneliness Predicts Increased Blood Pressure: 5-Year Cross-Lagged Analyses in Middle-Aged and Older Adults*, 25 PSYCHOL. & AGING 132, 132 (2010); Nicole K. Valtorta et al., *Loneliness and Social Isolation as Risk Factors for Coronary Heart Disease and Stroke: Systematic Review and Meta-Analysis of Longitudinal Observational Studies*, 102 HEART 1009, 1010, 1014 (2016) (finding from a narrative review of twenty-three studies and a meta-analysis of eleven coronary heart disease (CHD) studies and eight stroke studies that social isolation increases risk for CHD by 29 percent and stroke by 32 percent).

sleep,<sup>50</sup> metabolic syndrome and obesity,<sup>51</sup> increased activity of stress hormones and the hypothalamic pituitary adrenocortical (HPA) axis,<sup>52</sup> disrupted gene expression that reduces inflammatory control,<sup>53</sup> and impaired immune system function.<sup>54</sup>

The estimated effect sizes of these relationships are often large. For instance, a meta-analysis of 148 social isolation studies found that stronger social connections decreased the risk of mortality by 50 percent.<sup>55</sup> The mechanisms linking social isolation to such negative outcomes remain under investigation, but one line of research implicates the HPA axis.<sup>56</sup> It may be that social isolation results in increased activation of this axis, which promotes the secretion of glucocorticoid hormones like cortisol that can result in either transient or chronic changes in cortisol concentration.<sup>57</sup> Alterations in the baseline activity of the HPA axis can negatively impact humans both physically and psychologically because glucocorticoids regulate the expression of genes related to metabolism, inflammation, cardiovascular activity, the immune system, and neurodegeneration.<sup>58</sup>

## 2. Why Does Isolation Harm the Brain?

Emerging research is providing insight into the brain circuits that are likely to be deleteriously affected by prolonged social isolation. This research remains limited and is generally based on nonhuman animal models. A variety of such studies with nonhuman animals have examined the effect of isolation on behavior.<sup>59</sup> Animal studies allow researchers to carefully control experimental conditions and establish

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50. See John T. Cacioppo et al., *Do Lonely Days Invade the Nights? Potential Social Modulation of Sleep Efficiency*, 13 PSYCHOL. SCI. 384, 384 (2002); Cacioppo et al., *supra* note 49, at 407; John T. Cacioppo et al., *The Neuroendocrinology of Social Isolation*, 66 ANN. REV. PSYCHOL. 733, 733 (2015) [hereinafter Cacioppo et al., *Neuroendocrinology*].

51. See Mark A. Whisman, *Loneliness and the Metabolic Syndrome in a Population-Based Sample of Middle-Aged and Older Adults*, 29 HEALTH PSYCHOL. 550, 550 (2010).

52. See Emma K. Adam et al., *Day-To-Day Dynamics of Experience-Cortisol Associations in a Population-Based Sample of Older Adults*, 103 PROC. NAT'L ACAD. SCI. 17058, 17058 (2006).

53. Steve W. Cole, *Social Regulation of Leukocyte Homeostasis: The Role of Glucocorticoid Sensitivity*, 22 BRAIN BEHAV. & IMMUNITY 1049, 1053–54 (2008).

54. See Sarah D. Pressman et al., *Loneliness, Social Network Size, and Immune Response to Influenza Vaccination in College Freshmen*, 24 HEALTH PSYCHOL. 297, 297 (2005).

55. See Holt-Lunstad et al., *supra* note 47, at 4; Julianne Holt-Lunstad et al., *Loneliness and Social Isolation as Risk Factors for Mortality: A Meta-Analytic Review*, 10 PERSP. ON PSYCHOL. SCI. 227, 227 (2015).

56. See Adam et al., *supra* note 52, at 17058.

57. See *id.* at 17061.

58. See Cole, *supra* note 53, at 1049.

59. See Cacioppo et al., *Neuroendocrinology*, *supra* note 50, at 733.

causality with more certainty; however, whether and how these studies translate to humans remains uncertain. Moreover, the effects of social isolation obtained through animal models vary significantly depending on the species assessed and on the specific effect being measured.<sup>60</sup> Social isolation in mammalian species generally results in increased levels of cortisol depending on the time and severity of separation. For example, isolation for brief periods of time typically produces a smaller change in cortisol than long-term isolation.<sup>61</sup> The physiological effects of mild social isolation in nonhuman primate models also appear similar to effects observed in humans, including greater risk of mortality due to an increased sensitivity of the immune system.<sup>62</sup> Drilling down to the neuronal level, some evidence suggests that dopaminergic neurons in the dorsal raphe nucleus (DRN) represent the experience of social isolation.<sup>63</sup> Social isolation may increase the synaptic strength between excitatory neurons and dopaminergic neurons in the DRN, which is involved in the perception of social reward.<sup>64</sup>

In addition to nonhuman animal studies, researchers have used noninvasive brain imaging to examine the effect of isolation. For example, a study by neuroscientist John Cacioppo and his colleagues used functional magnetic resonance imaging (fMRI) to assess how perceptions of social situations differ in socially isolated and nonisolated adults.<sup>65</sup> Cacioppo found that adults who experience social isolation respond differently to positive and negative social situations than nonisolated adults.<sup>66</sup> Isolated adults exhibited reduced activation

60. See Soaleha Shams et al., *Effect of Social Isolation on Anxiety-Related Behaviors, Cortisol, and Monoamines in Adult Zebrafish*, 131 BEHAV. NEUROSCIENCE 492, 492 (2017). For instance, in a study performed in 2017, researchers assessed how zebrafish responded to social stimuli after short-term (24 hour) and long-term (6 month) isolation. See *id.* They found that serotonin concentration increased following social stimuli in acutely isolated fish, but that other neurotransmitters (dopamine, DOPAC, and 5HIAA) decreased in chronically isolated fish. See *id.*

61. See *id.*

62. See *id.*

63. See Gillian A. Matthews et al., *Dorsal Raphe Dopamine Neurons Represent the Experience of Social Isolation*, 164 CELL 617, 619 (2016) (finding that dopaminergic neurons in the dorsal raphe nucleus (DRN) exhibit synaptic changes following acute (short-term) social isolation in mice).

64. See *id.* at 626. This increased activity may result from isolation changing the type of glutamate receptors in the synapse to receptors that exhibit a higher conductance. See *id.* at 619. Using optogenetics, Matthews found that activation of DRN dopaminergic neurons produced feelings of social isolation, and inhibition of these neurons reduced these feelings. See *id.* at 623.

65. See John T. Cacioppo et al., *In the Eye of the Beholder: Individual Differences in Perceived Social Isolation Predict Regional Brain Activation to Social Stimuli*, 21 J. COGNITIVE NEUROSCIENCE 83, 84 (2009).

66. See *id.* at 88, 90.

of the ventral striatum in response to pleasant social images, and increased activation of the visual cortex in response to unpleasant social images, which differed for nonisolated adults.<sup>67</sup> These results suggested that isolated adults respond strongly to the perception of distress and feel less rewarded by positive social interaction compared to their nonisolated counterparts.<sup>68</sup> A subsequent neuroimaging study similarly found that socially isolated individuals perceive threatening social stimuli from nonthreatening social stimuli much more quickly than nonisolated individuals.<sup>69</sup> This hypervigilant response corresponds with continuous activation of certain neural networks involved in alertness.<sup>70</sup>

The brain evidence, of course, remains preliminary and speculative, and identifying brain changes specifically due to the experience of solitary confinement is immensely challenging. A review of the relevant research revealed only one study, published in 1972, that directly measured brain activity in inmates experiencing solitary confinement. In that study, Canadian psychologist Paul Gendreau used electroencephalography (EEG) to measure the effects of solitary confinement on neural activity and response latency in twenty prison inmates.<sup>71</sup> In EEG, electrodes are placed on the human head to measure the electrical activity of the cerebral cortex.<sup>72</sup> That activity is

67. See *id.* at 89.

68. See *id.* A similar study performed in 170 adolescents found that socially isolated adolescents exhibited a higher sensitivity to distressing facial cues, which suggests that these response patterns can begin in early life and persist into adulthood. See Janne Vanhalst et al., *Lonely Adolescents Exhibit Heightened Sensitivity for Facial Cues of Emotion*, 31 COGNITION & EMOTION 377, 378, 381 (2017). Interestingly, sensitivity to socioemotional facial cues is also characteristic of individuals with generalized anxiety disorder.

69. See Stephanie Cacioppo et al., *Loneliness and Implicit Attention to Social Threat: A High-Performance Electrical Neuroimaging Study*, 7 COGNITIVE NEUROSCIENCE 138, 155 (2016).

70. See *id.* There are other potential explanations as well. One fMRI study suggests that perceived social isolation correlated with increased functional connectivity in the cingulo-opercular network, an area that mediates chronic alertness and mental arousal. See Elliot A. Layden et al., *Perceived Social Isolation Is Associated with Altered Functional Connectivity in Neural Networks Associated with Tonic Alertness and Executive Control*, 145 NEUROIMAGE 58, 70 (2017). However, functional connectivity between this network and the frontal gyrus, which mediate executive function, was reduced. See *id.* The authors concluded that these changes could reflect behavioral effects of social isolation, including increased “vigilance for social threats,” “fixation of negative social scenes,” and rapid processing of “negative social information.” *Id.* These behavioral effects may “sap vital resources” that could otherwise be devoted to normal executive functioning. *Id.*

71. See Paul Gendreau et al., *Changes in EEG Alpha Frequency and Evoked Response Latency During Solitary Confinement*, 79 J. ABNORMAL PSYCHOL. 54, 56 (1972). Response latency is the amount of time between administration of a stimulus and the resulting behavioral or neural response. See PAUL J. LAVRAKAS, *Response Latency*, in ENCYCLOPEDIA OF SURVEY RESEARCH METHODS 753, 753 (2008).

72. See OWEN D. JONES, JEFFREY D. SCHALL & FRANCIS X. SHEN, LAW AND NEUROSCIENCE 758 (2014).



recorded and analyzed with the aid of a computer system, and the results allow for inferences about brain function.<sup>73</sup>

Gendreau's study subjected the inmates to solitary confinement for one week. It also used an EEG before and after confinement to detect alpha waves—a measure of neuronal activity in the thalamus—and response latency.<sup>74</sup> Previous research identified that lower EEG alpha frequency occurred in individuals subjected to sensory deprivation, which might indicate reduced arousal.<sup>75</sup> Previous research also correlated sensory deprivation with heightened neurological response (or reduced latency) to environmental stimuli following deprivation.<sup>76</sup> Gendreau sought to determine if these conclusions applied to inmates in solitary confinement.<sup>77</sup> Gendreau found that following one week in solitary confinement, inmates exhibited significantly lower EEG alpha frequency and reduced latency (or increased response sensitivity) to visually evoked stimuli.<sup>78</sup> Gendreau speculated that the "gradual EEG shift to lower frequencies may represent a tendency toward increased theta activity," which commonly occurs in conjunction with inmate frustration and stress.<sup>79</sup> Additionally, lower EEG frequency could also be a sign of the inmate adapting to an environment with such limited sensory stimulation, and experimental data suggest that this adaptation occurs within the first four days of confinement.<sup>80</sup> Regarding the shorter latency to visual stimuli, Gendreau speculated that this change "may represent an increased readiness to respond to external stimulation as solitary confinement progresses."<sup>81</sup> Put another way, suddenly opening the shades to let in the sun in the morning might be a shock to the system, so too might an inmate—after so much time away from human contact—react very strongly to being reintroduced to human contact.

Research like Gendreau's has not, to the Author's knowledge, continued into the present day. Thus, one is left to speculate on precisely how solitary confinement affects the brain. The legal implications of this research gap are discussed at greater length in Part III.

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73. See *id.* at 250, 328.

74. See Gendreau et al., *supra* note 71, at 56.

75. See *id.* at 54.

76. See *id.*

77. See *id.*

78. See *id.* at 56.

79. *Id.* at 57.

80. See *id.*

81. *Id.* at 58.

### 3. Evidence on the Relationship Between Short- and Long-Term Solitary Confinement and Mental Health

In addition to brain science research, there is a larger body of behavioral and psychological research literature on the psychological effects of solitary confinement. This literature, however, is mixed in its findings.<sup>82</sup> These mixed findings are in part because of methodological limitations.<sup>83</sup> Other factors also play a role in these mixed findings, including solitary confinement not being a uniform intervention and preexisting mental health conditions potentially making inmates more (or less) able to withstand the experience.<sup>84</sup>

Still, there is a recognized “overall consensus” on the “harmfulness of long-term punitive isolation,” including the following observations<sup>85</sup>:

- Inmates in solitary confinement are more likely to develop psychiatric disorders.<sup>86</sup>
- Inmates in solitary confinement exhibit increased acts of self-harm.<sup>87</sup>

82 See, e.g., Bruce A. Arrigo & Jennifer Leslie Bullock, *The Psychological Effects of Solitary Confinement on Prisoners in Supermax Units: Reviewing What We Know and Recommending What Should Change*, 52 INT'L J. OFFENDER THERAPY & COMP. CRIMINOLOGY 622, 622, 630 (2008) (“Although the psychological consequences of long-term solitary confinement on prisoners have been demonstrated, there is less evidence that short-term solitary confinement has similar deleterious effects.”); Peter Scharff Smith, *The Effects of Solitary Confinement on Prison Inmates: A Brief History and Review of the Literature*, 34 CRIME & JUST. 441, 441, 504 (2006) (reviewing the literature and finding that “knowledge is . . . tentative concerning what happens upon release from solitary confinement,” with some studies suggesting few lasting effects and other studies suggesting chronic effects of solitary confinement).

83. See Robert G. Morris, *Exploring the Effect of Exposure to Short-Term Solitary Confinement Among Violent Prison Inmates*, 32 J. QUANTITATIVE CRIMINOLOGY 1, 2–3 (2016) (the mixed results are in part because “[f]ew studies have focused on post-[solitary confinement] behavior and even fewer have attempted to parse out any causal effect from exposure to [solitary confinement] on subsequent behavioral outcomes at the individual-level”).

84. See Smith, *supra* note 82, at 441.

85. Craig Haney, *A Culture of Harm: Taming the Dynamics of Cruelty in Supermax Prisons*, 35 CRIM. JUST. & BEHAV. 956, 956 (2008); see, e.g., Stuart Grassian, *Psychiatric Effects of Solitary Confinement*, 22 WASH. U. J.L. & POL'Y 325, 327 (2006); R. George Wright, *What (Precisely) Is Wrong with Prolonged Solitary Confinement?*, 64 SYRACUSE L. REV. 297, 297 (2014).

86. See Henrik Steen Andersen et al., *A Longitudinal Study of Prisoners on Remand: Psychiatric Prevalence, Incidence and Psychopathology in Solitary vs. Non-Solitary Confinement*, 102 ACTA PSYCHIATRICA SCANDINAVICA 19, 20, 21 (2000) (finding inmates in solitary confinement were more likely to develop a psychiatric disorder than inmates not in solitary confinement (28 percent versus 15 percent, respectively) through a longitudinal study of 133 inmates in and 95 inmates not in solitary confinement).

87. See E. FULLER TORREY ET AL., TREATMENT ADVOCACY CTR., THE TREATMENT OF PERSONS WITH MENTAL ILLNESS IN PRISONS AND JAILS: A STATE SURVEY 7 (2014); Fatos Kaba et al., *Solitary Confinement and Risk of Self-Harm Among Jail Inmates*, 104 AM. J. PUB. HEALTH 442, 442–44 (2014) (revealing, based on an assessment of medical records from 244,699 incarcerated persons in New York City jails, that while inmates who were subjected to solitary confinement

- Inmates in solitary confinement exhibit increased ideation and completion of suicide.<sup>88</sup>
- The effects of short-term solitary confinement may not be as detrimental as long-term confinement.<sup>89</sup>
- There is no reduction in post-solitary violence by the inmates.<sup>90</sup>
- Solitary confinement “post-release syndrome” may develop.<sup>91</sup>

There is evidence that giving solitary confinement to prisoners who suffer from mental illness may be especially detrimental, further exacerbating symptoms associated with the mental illness.<sup>92</sup>

Supermax prisons have been described as “expensive and soul destroying” by a bipartisan commission that investigated the issue.<sup>93</sup> These and other negative consequences of solitary confinement are why so many organizations and medical professionals have criticized the practice.<sup>94</sup> Critics include the American Civil Liberty Union,<sup>95</sup> the

accounted for nearly half (53.3 percent) of the 2,182 acts of self-harm and 45 percent of the 103 potentially fatal acts of self-harm occurred, despite only accounting from 7.3 percent of the general incarcerated population).

88. See Raymond F. Patterson & Kerry Hughes, *Review of Completed Suicides in the California Department of Corrections and Rehabilitation, 1999 to 2004*, 59 PSYCHIATRIC SERVS. 676, 676, 681 (2008) (an assessment of completed suicide records in the California Department of Corrections and Rehabilitation between the years 1999 and 2004 revealed that 53 percent of all completed suicides were performed by inmates in solitary confinement, despite this group only accounting for between 3–8 percent of the general incarcerated population).

89. See Arrigo & Bullock, *supra* note 82, at 630 (“Although the psychological consequences of long-term solitary confinement on prisoners have been demonstrated, there is less evidence that short-term solitary confinement has similar deleterious effects.”); James Bonta & Paul Gendreau, *Reexamining the Cruel and Unusual Punishment of Prison Life*, 14 L. & HUM. BEHAV. 347, 360 (1990).

90. See Morris, *supra* note 83, at 19 (“[S]ubjecting inmates to short-term SC in response to initial acts of violence tends [to] not appear to have direct consequences on the likelihood or timing of subsequent violence and other maladaptive behavior, or on misconduct development during the 6-months following initial violence.”).

91. KUPERS, *supra* note 9, at 151–67. Psychiatrist Terry Allen Kupers has treated inmates in solitary confinement and has observed supermax prisons as part of class action lawsuits. *Id.* at 27.

92. See Jamie Fellner, *Callous and Cruel: Use of Force Against Inmates with Mental Disabilities in US Jails and Prisons*, HUMAN RTS. WATCH (May 12, 2015), <https://www.hrw.org/report/2015/05/12/callous-and-cruel/use-force-against-inmates-mental-disabilities-us-jails-and#> [https://perma.cc/4UPR-DJY2].

93. John J. Gibbons & Nicholas de Belleville Katzenbach, *Confronting Confinement: A Report of the Commission on Safety and Abuse in America's Prisons*, 22 WASH. U. J.L. & POL'Y 385, 470 (2006).

94. See Jeffrey L. Metzner & Jamie Fellner, *Solitary Confinement and Mental Illness in U.S. Prisons: A Challenge for Medical Ethics*, 38 J. AM. ACAD. PSYCHIATRY & L. 104, 105 (2010).

95. See AM. CIVIL LIBERTIES UNION, BRIEFING PAPER: THE DANGEROUS OVERUSE OF SOLITARY CONFINEMENT IN THE UNITED STATES 4 (2014), [https://www.aclu.org/sites/default/files/assets/stop\\_solitary\\_briefing\\_paper\\_updated\\_august\\_2014.pdf](https://www.aclu.org/sites/default/files/assets/stop_solitary_briefing_paper_updated_august_2014.pdf) [https://perma.cc/H55Q-5F4Q].

American Psychiatric Association,<sup>96</sup> and professionals in the mental health,<sup>97</sup> medicine,<sup>98</sup> public health,<sup>99</sup> and pediatrics communities.<sup>100</sup>

### III. LEGAL REFORM AND THE LIKELY PERSISTENCE OF SOLITARY CONFINEMENT

*“Throughout its ‘very interesting history,’ solitary confinement has always been the alternative system—a perpetual experiment, refined, polished, and repackaged, but never abandoned. It is a perennial practice of last resort for those seeking control within prison walls.”*

—Ashley T. Rubin & Keramet Reiter (2017)<sup>101</sup>

*“Virtually every court which has considered the issue has held that the imposition of solitary confinement, without more, does not violate the Eighth Amendment. Arguments that isolation offends evolving standards of decency, that it constitutes psychological torture, and that it is excessive because less severe sanctions would be equally efficacious, have routinely failed.”*

—Michael B. Mushlin (2009)<sup>102</sup>

There have been a series of lawsuits and legislative actions aimed at either modifying or wholly eliminating the practice of prolonged solitary confinement.<sup>103</sup> This Part summarizes those

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96. See AM. PSYCHIATRIC ASS'N, POSITION STATEMENT ON SEGREGATION OF PRISONERS WITH MENTAL ILLNESS 1 (2013).

97. See, e.g., Cyrus Ahalt et al., *Solitary Confinement in Prison: We Need to Change the Clinicians' Role*, 359 BRIT. MED. J. 150, 152 (2017).

98. See Ahalt & Williams, *supra* note 27, at 1705.

99. See Cloud et al., *supra* note 3, at 21.

100. See Mikah Owen & Jeffrey Goldhagen, *Children and Solitary Confinement: A Call to Action*, 137 PEDIATRICS e20154180, at 3 (2016).

101. Ashley T. Rubin & Keramet Reiter, *Continuity in the Face of Penal Innovation: Revisiting the History of American Solitary Confinement*, 43 LAW & SOC. INQUIRY 1604, 1605 (2018).

102. Jeffrey Smith McLeod, *Anxiety, Despair, and the Maddening Isolation of Solitary Confinement: Invoking the First Amendment's Protection Against State Action That Invades the Sphere of the Intellect and Spirit*, 70 U. PITTS. L. REV. 647, 663 (2009).

103. See *Hutto v. Finney*, 437 U.S. 678, 687 (1978); *Finney v. Hutto*, 410 F. Supp. 251, 275 (E.D. Ark. 1976); Solitary Confinement Reform Act, S. 2724, 115th Cong. (2018); Eleanor Umphres, *Solitary Confinement: An Unethical Denial of Meaningful Due Process*, 30 GEO. J. LEGAL ETHICS 1057, 1061 (2017) (“[T]he use of solitary confinement may be unconstitutional, depending on the duration of the confinement and the conditions within isolation.”).

litigation and legislative efforts.<sup>104</sup> Section III.A reviews Eighth Amendment constitutional challenges to the practice of solitary confinement.<sup>105</sup> Section III.B reviews recent legislative action.

*A. The Limited Impact of Solitary Confinement Eighth Amendment Constitutional Challenges*

The Eighth Amendment to the US Constitution states that “[e]xcessive bail shall not be required, nor excessive fines imposed, nor cruel and unusual punishments inflicted.”<sup>106</sup> What these words mean is contested.<sup>107</sup> It is beyond the scope of this Article to provide a robust analysis of Eighth Amendment jurisprudence,<sup>108</sup> and this Article does not engage with arguments about whether the scope of US Supreme Court review over criminal sentencing should change.<sup>109</sup> Here, it is sufficient for present purposes to recognize that since the late 1970s, however, the US Supreme Court has expanded the reach of the

104. This is not an exhaustive review and focuses primarily on Eighth Amendment challenges. While challenges grounded in the Fourteenth Amendment are legally distinct, they are likely to invoke the same type of neuroscientific evidence considerations.

105. For purposes of length and focus, this Article limits its analysis in several ways. First, it focuses primarily on Eighth Amendment challenges because the cruel and unusual punishment standard seems particularly apt for the types of evidence this Article explores. But this is not to say that related challenges, for instance on Fourteenth Amendment grounds, are not also implicated by my analysis. See Cedric Richmond, *Toward a More Constitutional Approach to Solitary Confinement: The Case for Reform*, 52 HARV. J. ON LEGIS. 1, 11 (2015) (“Solitary confinement also raises due process concerns.”). Second, I focus primarily on solitary confinement in prisons (with over-emphasis on the conditions of federal prisons). But I do not mean to imply that solitary confinement in county jails is not problematic as well. There are many cases challenging isolation practices in jails. See, e.g., *Graves v. Arpaio*, 48 F. Supp. 3d 1318, 1325, 1335–36, 1339 (D. Ariz. 2014). In addition, the issue is being debated as jail conditions receive more media attention. See, e.g., Taylor Elizabeth Eldridge, *Rikers Doesn’t Put Teens in Solitary. Other New York Jails Do.*, MARSHALL PROJECT (Mar. 28, 2018, 12:01 AM), <https://www.themarshallproject.org/2018/03/28/rikers-doesn-t-put-teens-in-solitary-other-new-york-jails-do> [<https://perma.cc/4CGP-LTUE>]. I would hope that future research extends my consideration of neuroscience and AI into those additional legal and incarceration contexts.

106. U.S. CONST. amend. VIII.

107. See Erin E. Braatz, *The Eighth Amendment’s Milieu: Penal Reform in the Late Eighteenth Century*, 106 J. CRIM. L. & CRIMINOLOGY 405, 405 (2016).

108. For an excellent historical treatment, see *id.* at 412 (“[I]f American jurisprudence is to engage honestly and rigorously with the history of penal changes and reform, then the experiments with and discussions regarding penal reform that occurred in the American colonies following the Revolution, and the continuing impact of the underlying arguments and beliefs, cannot continue to be ignored.”).

109. See, e.g., Rachel E. Barkow, *The Court of Life and Death: The Two Tracks of Constitutional Sentencing Law and the Case for Uniformity*, 107 MICH. L. REV. 1145, 1147 (2009).

punishments clause to prohibit certain types of incarceration practices.<sup>110</sup>

Presently, in order to show that prison conditions—including but not limited to solitary confinement—violate the Eighth Amendment, an inmate “must demonstrate an objective component of whether the conditions were a ‘sufficiently serious’ deprivation of human needs and a subjective component of whether prison officials acted with deliberate indifference to the conditions of confinement.”<sup>111</sup> Courts often note that “what constitutes cruel and unusual punishment in the constitutional sense is a matter which defies concrete definition”<sup>112</sup> and that the Constitution “does not mandate comfortable prisons’ and only those deprivations denying ‘the minimal civilized measure of life’s necessities,’ are sufficiently grave to form the basis of an Eighth Amendment violation.”<sup>113</sup>

In short, just because prison conditions are bad, it does not follow that they are so bad as to rise to the level of a constitutional violation.<sup>114</sup> So what counts as *constitutionally* impermissible? In *Estelle v. Gamble*, the Court held that “deliberate indifference to serious medical needs of prisoners constitutes the ‘unnecessary and wanton infliction of pain’ proscribed by the Eighth Amendment.”<sup>115</sup> Other examples of Eighth Amendment violations might include the failure to maintain certain minimum sanitation standards<sup>116</sup> and the failure to provide adequate opportunity for exercise.<sup>117</sup>

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110. See Elizabeth Bennion, *Banning the Bing: Why Extreme Solitary Confinement Is Cruel and Far Too Usual Punishment*, 90 IND. L.J. 741, 767 (2015) (“Several cases following *Estelle* indicated that the Supreme Court would be willing to consider prison conditions generally (beyond issues of medical attention) under the Eighth Amendment.”).

111. *Nifas v. Wetzel*, No. 1736 C.D.2014, 2015 WL 5445058, at \*3 (Pa. Commw. Ct. June 5, 2015) (citing *Wilson v. Seiter*, 501 U.S. 294, 298, 303 (1991)).

112. E.g., *Commonwealth ex rel. Bryant v. Hendrick*, 280 A.2d 110, 116 (Pa. 1971).

113. *Wilson*, 501 U.S. at 298 (citations and quotation marks omitted) (quoting *Rhodes v. Chapman*, 452 U.S. 337, 347, 349 (1981)).

114. See *Davis v. Ayala*, 135 S. Ct. 2187, 2210 (2015) (“In a case that presented the issue, the judiciary *may* be required, within its proper jurisdiction and authority, to determine whether workable alternative systems for long-term confinement exist, and, if so, whether a correctional system should be required to adopt them.” (emphasis added)).

115. *Estelle v. Gamble*, 429 U.S. 97, 104 (1976) (citation omitted) (quoting *Gregg v. Georgia*, 428 U.S. 153, 173 (1976)).

116. See *Wright v. McMann*, 387 F.2d 519, 519 (2d Cir. 1967); *Jordan v. Fitzharris*, 257 F. Supp. 674, 682 (N.D. Cal. 1966); *Taylor v. Larson*, 505 F. App’x 475 (6th Cir. 2012).

117. *Anderson v. Colorado, Dep’t of Corr.*, 848 F. Supp. 2d 1291 (D. Colo. 2012).

Moreover, it is not enough to simply show inhumane conditions.<sup>118</sup> The inmate must also show that the prison officials *knew* the conditions were inhumane. The Supreme Court has held that *Estelle* stands “for the proposition that Eighth Amendment liability requires ‘more than ordinary lack of due care for the prisoner’s interests or safety.’”<sup>119</sup> In *Farmer v. Brennan*, the Court clarified the requisite mens rea to show an Eighth Amendment violation:

[A] prison official cannot be found liable under the Eighth Amendment for denying an inmate humane conditions of confinement unless the official knows of and disregards an excessive risk to inmate health or safety; the official must both be aware of facts from which the inference could be drawn that a substantial risk of serious harm exists, and he must also draw the inference.<sup>120</sup>

In 2005, inmates at a supermax facility in Ohio argued that the use of solitary confinement violated both the Fourteenth Amendment liberty interest and the Eighth Amendment cruel and unusual punishment clause.<sup>121</sup> In assessing the conditions at the supermax prison, Justice Kennedy observed the following:

Inmates must remain in their cells, which measure 7 by 14 feet, for 23 hours per day. . . . Incarceration at OSP is synonymous with extreme isolation. In contrast to any other Ohio prison, including any segregation unit, OSP cells have solid metal doors with metal strips along their sides and bottoms which prevent conversation or communication with other inmates. All meals are taken alone in the inmate’s cell instead of in a common eating area. Opportunities for visitation are rare and in all events are conducted through glass walls. It is fair to say OSP inmates are deprived of almost any environmental or sensory stimuli and of almost all human contact.<sup>122</sup>

Yet, because the case was decided on Fourteenth Amendment grounds, the Court did not reach the Eighth Amendment question.<sup>123</sup>

In sum, then, the conditions of solitary confinement are regularly challenged by inmates on the grounds that they are “cruel and unusual” in violation of the Constitution.<sup>124</sup> But courts typically find that the conditions—while certainly harsh—are not *so* bad as to be deemed unconstitutional.<sup>125</sup> It has been observed that “[v]irtually every court which has considered the issue has held that the imposition of

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118. See *Farmer v. Brennan*, 511 U.S. 825, 838 (1994) (“[W]e [have] rejected a reading of the Eighth Amendment that would allow liability to be imposed on prison officials solely because of the presence of objectively inhumane prison conditions.”).

119. *Id.* at 835 (citing *Whitley v. Albers*, 475 U.S. 312, 319 (1986)).

120. *Id.* at 837.

121. See *Wilkinson v. Austin*, 545 U.S. 209, 213, 218 (2005).

122. *Id.* at 214.

123. *Id.* at 229.

124. See, e.g., *id.*

125. See *Ford v. Bd. of Managers of N.J. State Prison*, 407 F.2d 937, 940 (3d Cir. 1969).

solitary confinement, without more, does not violate the Eighth Amendment.”<sup>126</sup>

This excerpt from a 2015 Pennsylvania case illustrates a typical court response:

Based on the evidence reviewed, the basic requirements of life are met in this unit, including food, clothing, shelter, medical attention, and basic hygiene. Exercise and use of the law library, although perhaps not available to the extent [Appellants] and this Court might like, are made available. Many of the conditions, such as the noise level and the feces throwing, are to some extent out of the control of the prison officials, but to the extent that they are not, actions are taken, such as the door modifications, to improve those situations. The heat doesn't work very well, but the prison has taken steps to bring it up to standard. Blankets are made available when it is cold. . . . the conditions complained of here . . . do not show that they “either alone or in combination with other conditions, deprived [Appellants] of ‘the minimal civilized measure of life's necessities,’ or at least a ‘single, identifiable human need.’”<sup>127</sup>

Although there is mounting scholarly argument that solitary confinement ought to be considered as cruel and unusual punishment under the Eighth Amendment,<sup>128</sup> it appears that an outright ban on the practice is unlikely.

It is important to note that although the general practice of solitary confinement has not been struck down, courts have found constitutional violations on narrower grounds. For instance, courts have found that keeping mentally ill inmates in solitary confinement can constitute cruel and unusual punishment.<sup>129</sup> In *Madrid v. Gomez*, the court reasoned as follows:

[W]e are not persuaded that the SHU [security housing unit], as currently operated, violates Eighth Amendment standards vis-a-vis all inmates. We do find, however, that conditions in the SHU violate such standards *when imposed on certain subgroups of the inmate population*, and that defendants have been deliberately

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126. McLeod, *supra* note 102, at 663. McLeod goes on to observe that “[a]rguments that isolation offends evolving standards of decency, that it constitutes psychological torture, and that it is excessive because less severe sanctions would be equally efficacious, have routinely failed.” *Id.*

127. *Rivera v. Pa. Dep’t of Corr.*, 837 A.2d 525, 532–34 (2003).

128. See, e.g., Thomas L. Hafemeister & Jeff George, *The Ninth Circle of Hell: An Eighth Amendment Analysis of Imposing Prolonged Supermax Solitary Confinement on Inmates with a Mental Illness*, 90 DENV. U. L. REV. 1, 2 (2012); Umphres, *supra* note 103, at 1091; Elizabeth Vasiliades, *Solitary Confinement and International Human Rights: Why the U.S. Prison Systems Fails Global Standards*, 21 AM. U. INT’L L. REV. 71, 98–99 (2005).

129. See, e.g., *Jones ‘El v. Berge*, 164 F. Supp. 2d 1096, 1116 (W.D. Wis. 2001), *enforced sub nom Jones-El v. Berge*, 374 F.3d 541 (7th Cir. 2004); *Madrid v. Gomez*, 889 F. Supp. 1146, 1279–80 (N.D. Cal. 1995); see also David Fathi, *The Common Law of Supermax Litigation*, 24 PACE L. REV. 675, 676–77 (2004).



indifferent to the serious risks posed by subjecting such inmates to the SHU over extended periods of time.<sup>130</sup>

The court went on to observe that “if the particular conditions of segregation being challenged are such that they inflict a serious mental illness, greatly exacerbate mental illness, or deprive inmates of their sanity, then defendants have deprived inmates of a basic necessity of human existence—indeed, they have crossed into the realm of psychological torture.”<sup>131</sup>

The key question, the court wrote, was an evidentiary one: “[W]hile courts will reject Eighth Amendment claims where there is no persuasive evidence that the challenged conditions lead to serious mental injury, *where such injury can in fact be shown*, Eighth Amendment protections clearly come into play.”<sup>132</sup>

Showing *serious* psychological injury is not easy. Consider the Eighth Amendment challenge of Thomas Silverstein.<sup>133</sup> Silverstein, convicted of murdering two fellow inmates and a prison guard, has served over thirty years in solitary confinement.<sup>134</sup> Silverstein argued, on Eighth Amendment grounds, that his thirty years of solitary confinement were cruel and unusual punishment.<sup>135</sup>

The Bureau of Prisons acknowledged that Silverstein had symptoms of “depression, anxiety, cognitive impairment, and memory loss,” but they argued that all of the symptoms were “mild” and that “no expert was able to definitively conclude these mild conditions were caused by his segregated detention or that his isolation poses a substantial risk of future harm to him, given none of his mental conditions are severe and he has medicine and treatment available to him.”<sup>136</sup> The case was thus, in large part, an argument about the evidence of Silverstein’s harms. Were his harms “mild” or “severe”? What “caused” them? Would they get worse if he remained in solitary confinement?

In these cases, we see that litigants struggle to convince courts of the existence and extent of their injuries. From a law and

130. *Gomez*, 889 F. Supp. at 1261 (emphasis added).

131. *Id.* at 1264.

132. *Id.*

133. Silverstein has described his experiences in various places. See Jean Casella & James Ridgeway, *America’s Most Isolated Federal Prisoner Describes 10,220 Days in Extreme Solitary Confinement*, SOLITARY WATCH (May 5, 2011), <https://solitarywatch.org/2011/05/05/americas-most-isolated-federal-prisoner-describes-10220-days-in-extreme-solitary-confinement/> [https://perma.cc/ER79-6TEB].

134. *Silverstein v. Fed. Bureau of Prisons*, 559 F. App’x 739, 741–42 (10th Cir. 2014).

135. *Id.* at 741.

136. *Id.* at 750.

neuroscience perspective, this is not surprising because the primary harms inmates experience are cognitive harms. It has been recognized in many legal contexts that demonstrating the extent of a brain injury is difficult.<sup>137</sup> Silverstein's harms—memory loss, depression, and so forth—are invisible injuries. Causation of injuries that you cannot see can also be difficult to prove.

By contrast, imagine if Silverstein had experienced “mild” broken finger bones because every day the guards came in to his cell, took a soft hammer, and hammered his fingers. Imagine that they never hammered too hard, and that they always provided a splint and some Tylenol so that he could continue his daily activities. Would a court view this as permissible under the Eighth Amendment? It is possible, but it seems a court would be more likely to view such injuries as serious, clearly caused by the prison system, and therefore cruel and unusual punishment. How to make invisible injuries more visible is an evidentiary challenge that both neuroscience and AI may be poised to address.

### *B. Legislative Efforts to Reform Solitary Confinement*

Until relatively recently, legislatures have not focused on the conditions of solitary confinement.<sup>138</sup> As Keramet Reiter has documented in California, legislative oversight over supermax prisons became “almost nonexistent.”<sup>139</sup> Yet since roughly 2015, public attention to the issue of solitary confinement seems to have increased and a number of reform bills proposed. Many of these legislative proposals focus on juvenile solitary confinement.<sup>140</sup> This Section briefly summarizes some of those efforts at both the federal and state levels.

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137. See Stacey A. Tovino, *Will Neuroscience Redefine Mental Injury? Disability Benefit Law, Mental Health Parity Law, and Disability Discrimination Law*, 12 IND. HEALTH L. REV. 695, 696 (2015).

138. See *Davis v. Ayala*, 135 S. Ct. 2187, 2209–10 (2015) (“[D]espite scholarly discussion and some commentary from other sources, the condition in which prisoners are kept simply has not been a matter of sufficient public inquiry or interest.”).

139. REITER, *supra* note 36, at 98.

140. See Eli Hager, *Ending Solitary for Juveniles: A Goal Grows Closer*, MARSHALL PROJECT (Aug. 1, 2017, 10:00 PM), <https://www.themarshallproject.org/2017/08/01/ending-solitary-for-juveniles-a-goal-grows-closer> [<https://perma.cc/G25U-86UN>]. For updates on these reform efforts, see *Solitary Confinement*, MARSHALL PROJECT, <https://www.themarshallproject.org/records/71-solitary-confinement> [<https://perma.cc/YDU2-84E5>] (last visited Feb. 19, 2019).

### 1. Federal Legislative Efforts

The Department of Justice, under the Obama Administration, published an extensive report on the best practices for the use of solitary confinement.<sup>141</sup> On the basis of that report, President Obama issued an Executive Order in 2016 banning the use of solitary confinement for juveniles in the federal system.<sup>142</sup> This had limited effect on the states, however, and was criticized by some as not going far enough.<sup>143</sup> Nevertheless, it signaled an interest in changing the practice of solitary confinement.

In 2018, President Trump signed into law the First Step Act.<sup>144</sup> The act ushers in a variety of criminal justice reform measures, including a prohibition on the use of juvenile solitary confinement in federal prisons: “The use of room confinement at a juvenile facility for discipline, punishment, retaliation, or any reason other than as a temporary response to a covered juvenile’s behavior that poses a serious and immediate risk of physical harm to any individual, including the covered juvenile, is prohibited.”<sup>145</sup>

The passage of the First Step Act followed previous legislative efforts to curtail solitary confinement in juvenile populations.<sup>146</sup> The passage of the 2018 First Step Act was recognized by advocates as a major advance in reducing the use of solitary confinement.<sup>147</sup> It is an

141. See U.S. DEP’T OF JUSTICE, *supra* note 28, at 1.

142. See Barack Obama, *Why We Must Rethink Solitary Confinement*, WASH. POST (Jan. 25, 2016), [https://www.washingtonpost.com/opinions/barack-obama-why-we-must-rethink-solitary-confinement/2016/01/25/29a361f2-c384-11e5-8965-0607e0e265ce\\_story.html](https://www.washingtonpost.com/opinions/barack-obama-why-we-must-rethink-solitary-confinement/2016/01/25/29a361f2-c384-11e5-8965-0607e0e265ce_story.html) [<https://perma.cc/Z647-GFBC>].

143. See Carina Muir, Note, *Protecting America’s Children: Why an Executive Order Banning Juvenile Solitary Confinement Is Not Enough*, 44 PEPP. L. REV. 151, 153 (2017).

144. See First Step Act, Pub. L. No. 115-391, 132 Stat. 5194 (2018) (codified as amended at 18 U.S.C. § 5043 (2018)).

145. *Id.* The Act made further provisions aimed at reducing the use and duration of juvenile solitary confinement. See *id.*

146. For instance, in February 2017, Senator Cory Booker (D-NJ) and Senator James Lankford (R-OK) reintroduced the Maintaining Dignity and Eliminating Unnecessary Restrictive Confinement of Youth Act (MERCY Act). See *Proposed Federal Legislation*, STOP SOLITARY FOR KIDS, <http://www.stopsolitaryforkids.org/proposed-federal-legislation/> [<https://perma.cc/WDP9-L93N>] (last visited Feb. 22, 2018). In April 2017, Congressman Elijah Cummings (D-MD) and Senator Booker (D-NJ) introduced the Record Expungement Designed to Enhance Employment Act of 2017 (REDEEM Act). See *id.*

147. After passage of the First Step Act, the CEO of the Juvenile Law Center commented: “Youth solitary confinement can lead to self-harm and even suicide. This reform package takes the important step of prohibiting the use of solitary confinement for youth in the federal justice system. . . . The developing adolescent brain is especially harmed by solitary confinement. Every state should follow this federal lead to ban the use of solitary confinement of youth.” Press Release, Juvenile Law Center, With Senate Passage of First Step Act, Youth Solitary Confinement in Federal Detention One Step Closer to Being Abolished (Dec. 18, 2018), <https://jlc.org/news/senate->

important piece of policy reform, though at the time of this writing, it is still too early to determine the scope of its effects.

While most bills have targeted juvenile solitary confinement, in September 2016, Senator Dick Durbin (D-IL) introduced the Solitary Confinement Reform Act, which would have substantially limited the use of solitary confinement for *all* persons, including adults<sup>148</sup>—unlike the Acts listed above. The Solitary Confinement Reform Act would have limited the use of solitary confinement to the “briefest term” and the “least restrictive conditions practicable.”<sup>149</sup>

## 2. State Legislative Efforts

State efforts to curtail solitary confinement have been numerous, and—at least in some states—successful.<sup>150</sup> For instance, in 2014 alone, more states enacted solitary confinement reforms than in the previous sixteen years.<sup>151</sup> In 2016, California Governor Jerry Brown approved a law establishing strict guidelines for the placement of minors or wards in solitary confinement.<sup>152</sup> The law permits solitary confinement only after “less restrictive options have been attempted and exhausted, unless attempting those options poses a threat to the safety or security of any minor, ward, or staff.”<sup>153</sup> Confinement under this law may not be used as a form of “punishment, coercion,

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passage-first-step-act-youth-solitary-confinement-federal-detention-one-step-closer  
[<https://perma.cc/3W4W-KFCD>].

148. See Solitary Confinement Reform Act, S. 3242, 114th Cong. § 4050(b) (2016).

149. *Id.* § 4050(b)(1)(A). Individuals in solitary confinement must be afforded “[at least] 4 hours of out-of-cell time every day, unless the inmate poses a substantial and immediate threat.” During those out-of-cell hours, the inmate would have to be given as many “meaningful programming opportunities” and “as much meaningful interaction with others” as practicable. *Id.* § 4050(b)(1)(D).

150. See, e.g., ZACHARY HEIDEN, ACLU OF ME., CHANGE IS POSSIBLE: A CASE STUDY OF SOLITARY CONFINEMENT REFORM IN MAINE 1 (2013), <https://www.aclu.org/report/change-possible-case-study-solitary-confinement-reform-maine> [<https://perma.cc/B5YD-TQAK>]. It is evident that most of the focus has been on juvenile solitary confinement. The 2016 bill sponsored by Senator Durbin is an exception and is not likely to become law. See Hager, *supra* note 140; *infra* Section III.A.I.

151. See Eli Hager & Gerald Rich, *Shifting Away from Solitary*, MARSHALL PROJECT (Dec. 23, 2014, 1:12 PM), <https://www.themarshallproject.org/2014/12/23/shifting-away-from-solitary> [<https://perma.cc/V5VK-J75Y>]. See generally Blair Hickman & Christie Thompson, *The Best Reporting on Solitary Confinement*, MARSHALL PROJECT (Mar. 24, 2016, 7:00 AM), <https://www.themarshallproject.org/2016/03/24/the-best-reporting-on-solitary-confinement> [<https://perma.cc/RD7T-3QK9>] (collecting journalism on solitary confinement).

152. S. 1143, 2015-16 Leg., Reg. Sess. (Ca. 2016); John Kelly, *California Restricts Use of Solitary Confinement Practices at Juvenile Facilities*, CHRON. SOC. CHANGE (Sept. 28, 2016), <https://chronicleofsocialchange.org/justice/juvenile-justice-2/california-restricts-use-solitary-confinement-practices-juvenile-facilities> [<https://perma.cc/WY9T-NLRC>].

153. Cal. S. 1143 § 208.3(b)(1).

convenience, or retaliation by staff”<sup>154</sup> and may last no longer than four hours, unless prison staff feel that an extension is necessary.<sup>155</sup> The law remains unclear about what exactly constitutes a reasonable justification for extending the time in isolation, but the law does place further restrictions on the use of solitary confinement:

- (1) Room confinement shall not be used before other less restrictive options have been attempted and exhausted, unless attempting those options poses a threat to the safety or security of any minor, ward, or staff.
- (2) Room confinement shall not be used for the purposes of punishment, coercion, convenience, or retaliation by staff.
- (3) Room confinement shall not be used to the extent that it compromises the mental and physical health of the minor or ward.<sup>156</sup>

With this law, California joins the seventeen other states and D.C., which prohibit or limit juvenile solitary confinement.<sup>157</sup> Other states may soon pass similar laws. Nebraska legislators considered, though did not enact, a bill providing that “a juvenile shall not be placed in room confinement unless all other less-restrictive alternatives have been exhausted and the juvenile poses an immediate and substantial risk of harm to self or others.”<sup>158</sup>

While federal and state efforts have resulted in reducing the use of solitary confinement for juveniles, advocates continue to push for further reforms.<sup>159</sup> But these efforts are primarily targeted, at least for now, at the juvenile context and, even for juveniles, are not an outright

154. *Id.* § 208.3(b)(2). The law does not give examples of proper implementation. *See id.* § 208.3(b)(1)–(3). It is unclear what circumstances *would* merit solitary confinement under this law. *See id.*

155. *See id.* § 208.3(d).

156. *See id.* § 208.3(b)(1)–(3). The statute further instructs that “[i]f room confinement must be extended beyond four hours, staff shall do the following: (1) Document the reason for room confinement and the basis for the extension, the date and time the minor or ward was first placed in room confinement, and when he or she is eventually released from room confinement[,] (2) Develop an individualized plan that includes the goals and objectives to be met in order to reintegrate the minor or ward to general population[, and] (3) Obtain documented authorization by the facility superintendent or his or her designee every four hours thereafter.” *Id.* § 208.3(d)(1)–(3).

157. *See* Anne Teigen, *States That Limit or Prohibit Juvenile Shackling and Solitary Confinement*, NAT’L CONF. ST. LEGISLATURES (Aug. 16, 2018), <http://www.ncsl.org/research/civil-and-criminal-justice/states-that-limit-or-prohibit-juvenile-shackling-and-solitary-confinement635572628.aspx> [<https://perma.cc/DC6W-W68N>].

158. LB 870, 105th Leg., 2d Sess. § 2(3) (Neb. 2018). The bill holds that a juvenile must be held only long enough to dissipate the risk of harm, and only insofar as the confinement does not “compromise or harm the mental or physical health of the juvenile.” *Id.* § 2(4)(a)–(b).

159. *See* Priyanka Boghani, *Reducing Solitary Confinement, One Cell at a Time*, FRONTLINE (Apr. 18, 2017), <https://www.pbs.org/wgbh/frontline/article/reducing-solitary-confinement-one-cell-at-a-time/> [<https://perma.cc/A8HC-ZNHW>].

ban on the practice.<sup>160</sup> Thus, despite these many steps forward, the use of solitary confinement continues.

#### IV. THE EMERGENCE OF NEUROSCIENCE IN SOLITARY CONFINEMENT ADVOCACY

Given the lack of broad success in the courts, advocates in solitary confinement litigation have looked to neuroscience to aid their cause.<sup>161</sup> This Part reviews the use of neuroscience to date in solitary confinement cases. Section IV.A provides a brief discussion of neurolaw generally. Section IV.B then argues that the current limits of neuroscience—in particular the lack of any brain data from inmates in solitary—has resulted in neuroscience making only minimal contributions to litigation success.

##### A. *The Emergence of Neurolaw*

Neuroscience is being integrated into US law and policy in a variety of ways<sup>162</sup> as scholarship at the intersection of law and

160. See *id.* For instance, the Solitary Confinement Reform Act (2016) represents the most robust reform for all persons (including adults), and aims to cut back the duration and character of confinement—most notably, the bill mandates that inmates in solitary confinement must be given as much meaningful programming and connection with the outside prison population “as practicable.” Solitary Confinement Reform Act, S. 2724, 115th Cong. § 4050(b)(1)(C)–(D) (2018).

161. See Moheb Costandi, *Using Neuroscience Evidence to Argue Against Solitary Confinement*, DANA FOUND. (Jan. 3, 2019), [http://www.dana.org/News/Using\\_Neuroscience\\_Evidence\\_to\\_Argue\\_Against\\_Solitary\\_Confinement/](http://www.dana.org/News/Using_Neuroscience_Evidence_to_Argue_Against_Solitary_Confinement/) [https://perma.cc/RG9F-8TRP]; Craig Haney et al., Lecture and Panel Discussion at the University of California San Francisco/University of California Hastings Consortium on Law, Science & Health Policy Law & Neuroscience Conference: Neuroscience in Policy: Solitary Confinement in California (Feb. 17, 2017), <https://lecture.ucsf.edu/ets/Play/d0a31c2f1bdd40ebb113b708ae6301161d?catalog=c0ecb8c5-e9c0-494b-b4c7-68643c863863> [https://perma.cc/WH3C-Z9QM]; Carol Schaeffer, “Isolation Devastates the Brain”: The Neuroscience of Solitary Confinement, SOLITARY WATCH (May 11, 2016), <https://solitarywatch.org/2016/05/11/isolation-devastates-the-brain-the-neuroscience-of-solitary-confinement/> [https://perma.cc/2EH6-9CQT].

162. For lengthier and more comprehensive introductions to neurolaw, see Teneille Brown & Emily Murphy, *Through a Scanner Darkly: Functional Neuroimaging as Evidence of a Criminal Defendant’s Past Mental States*, 62 STAN. L. REV. 1119, 1119 (2010); Michael Freeman, *Introduction: Law and the Brain*, in LAW AND NEUROSCIENCE: CURRENT LEGAL ISSUES 1, 7 (Michael Freeman ed., 2011); Michael Freeman & Oliver R. Goodenough, *Introduction*, in LAW, MIND AND BRAIN 1, 3 (Michael Freeman & Oliver R. Goodenough eds., 2009); Brent Garland, *Neuroscience and the Law: A Report*, in NEUROSCIENCE AND THE LAW: BRAIN, MIND, AND THE SCALES OF JUSTICE 1, 3 (Brent Garland ed., 2004); Oliver R. Goodenough & Micaela Tucker, *Law and Cognitive Neuroscience*, 6 ANN. REV. L. & SOC. SCI. 61, 61 (2010); Henry T. Greely & Anthony D. Wagner, *Reference Guide on Neuroscience*, in REFERENCE MANUAL ON SCIENTIFIC EVIDENCE 747, 784, 796 (3d ed. 2011); Owen D. Jones & Francis X. Shen, *Law and Neuroscience in the United States*, in INTERNATIONAL NEUROLAW 349, 349 (Tade Spranger ed., 2012); Susan E. Rushing et al.,

neuroscience has increased,<sup>163</sup> including the publication of the first *Law and Neuroscience* casebook<sup>164</sup> and numerous conferences and continuing education programs.<sup>165</sup> Neuroscientific evidence is increasingly being employed in the courtroom,<sup>166</sup> and multiple websites make neurolaw news available to the interested public.<sup>167</sup>

Neuroscience has found particular acceptance in the realm of juvenile justice. Two juvenile public defenders in Virginia report that they use brain science “all the time on a variety of issues—transfer/certification, correctional versus non-correctional sentences, *Miranda*, accomplice liability, applicability of adult sentencing guidelines . . . . Basically, we try to work it in whenever we can.”<sup>168</sup>

The embrace of neuroscience in advocacy for juveniles is in large part because the US Supreme Court has cited to neuroscience in a series of Eighth Amendment cases related to juvenile sentencing. In *Roper v. Simmons*, the Court outlawed the death penalty for juveniles;<sup>169</sup> in *Graham v. Florida*, the Court outlawed life without the possibility of parole for nonhomicide juvenile offenders;<sup>170</sup> and in *Miller v. Alabama*, the Court found mandatory life without the possibility of parole unconstitutional for juvenile homicide offenders.<sup>171</sup>

In the wake of these rulings, lower courts, practitioners, and scholars have observed the potential implications of neuroscience for juvenile justice.<sup>172</sup> The standard logic of most of these arguments typically is consistent with Justice Kagan’s discussion in *Miller*:

*PET and SPECT, in* NEUROIMAGING IN FORENSIC PSYCHIATRY: FROM THE CLINIC TO THE COURTROOM 3, 11 (Joseph R. Simpson ed., 2012).

163. See Jones & Shen, *supra* note 162, at 352.

164. See *About the Book: Law and Neuroscience*, WOLTERS KLUWER, <http://www.aspenlawschool.com/books/lawandneuro/default.asp> [https://perma.cc/3XEQ-4H8B] (last visited Mar. 20, 2019).

165. See, e.g., *Education and Outreach*, MACARTHUR FOUND. RES. NETWORK ON LAW & NEUROSCIENCE, <http://www.lawneuro.org/outreach.php> [perma.cc/V72B-EYHL] (last visited Feb. 9, 2019).

166. See Farahany, *supra* note 4, at 485–86.

167. See, e.g., NEUROETHICS & L. BLOG, <http://kolber.typepad.com> [https://perma.cc/UDP7-N5CN] (last visited Feb. 14, 2019); RES. NETWORK ON L. & NEUROSCIENCE, <http://lawneuro.org/blog/> [https://perma.cc/T4QW-QDXK] (last visited Mar. 13, 2019). For a list of further resources see Francis X. Shen, *Keeping Up with Neurolaw: What to Know and Where to Look*, 50 CT. REV. 104, 104–06 (2014).

168. H. Ted Rubin, *The Legal Defense of Juveniles: Struggling but Pushing Forward*, 16 JUV. JUST. UPDATE 1, 2 (2010).

169. *Roper v. Simmons*, 543 U.S. 551, 578–79 (2005).

170. *Graham v. Florida*, 560 U.S. 48, 82 (2010).

171. *Miller v. Alabama*, 567 U.S. 460, 489 (2012).

172. See Jay D. Aronson, *Brain Imaging, Culpability and the Juvenile Death Penalty*, 13 PSYCHOL. PUB. POL’Y & L. 115, 138 (2007); Abigail A. Baird et al., *Juvenile NeuroLaw: When It’s Good It Is Very Good Indeed, and When It’s Bad It’s Horrid*, 15 J. HEALTH CARE L. & POL’Y 15, 30,

Our decisions rested not only on common sense—on what “any parent knows”—but on science and social science as well. . . . [I]n *Graham*, we noted that “developments in psychology and brain science continue to show fundamental differences between juvenile and adult minds”—for example, in “parts of the brain involved in behavior control.” We reasoned that those findings—of transient rashness, proclivity for risk, and inability to assess consequences—both lessened a child’s “moral culpability” and enhanced the prospect that, as the years go by and neurological development occurs, his “deficiencies will be reformed.”<sup>173</sup>

Many commentators now believe that “[t]he research in brain development has wide-ranging implications for juvenile offenders . . . [and] raises questions about current concepts of culpability, accountability and punishment, . . . transferring or relinquishing jurisdiction to adult courts, and labelling [sic] minors as sexual offenders or predators.”<sup>174</sup>

Given the success of integrating neuroscience in other areas of juvenile justice and the focus of advocates on juvenile solitary confinement, it is not surprising that recent cases challenging solitary confinement have turned to brain evidence. The next Section reviews these cases.

### *B. Neuroscience and Solitary Confinement Litigation*

Although, as reviewed above in Part III, the history of solitary confinement litigation has not significantly curtailed the practice, that may be slowly changing. As Keramet Reiter has written, “[p]rior to 2015, the law on solitary confinement seemed depressingly settled,” but 2015 offered hope.<sup>175</sup> Specifically, referring to his concurrence in *Davis*

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32–33 (2012); Katherine Hunt Federle & Paul Skendelas, *Thinking Like a Child: Legal Implications of Recent Developments in Brain Research for Juvenile Offenders*, in LAW, MIND AND BRAIN, at 199, 199 (2017); Staci A. Gruber & Deborah A. Yurgelun-Todd, *Neurobiology and the Law: A Role in Juvenile Justice?*, 3 OHIO ST. J. CRIM. L. 321, 322, 333 (2006); Terry A. Maroney, *Adolescent Brain Science After Graham v. Florida*, 86 NOTRE DAME L. REV. 765, 792 (2011) [hereinafter Maroney, *After Graham*]; Terry A. Maroney, *The False Promise of Adolescent Brain Science in Juvenile Justice*, 85 NOTRE DAME L. REV. 89, 175 (2009) [hereinafter Maroney, *The False Promise*]. This Article focuses only on the criminal justice implications of brain science in the legislature. As others have recognized and discussed, developmental neuroscience may also have implications for the demarcation of children’s rights. See Catherine J. Ross, *A Stable Paradigm: Revisiting Capacity, Vulnerability and the Rights Claims of Adolescents after Roper v. Simmons*, in LAW, MIND AND BRAIN, at 193–94 (2017). Developmental neuroscience has also played a role in legislative debate over early child intervention. See H.R. 2794, 112th Cong. § 4(1) (2011) (“Research conclusively shows that children’s experiences in the early years of life influence the developing brain and have a significant and lasting impact upon their ability to succeed in school and in life.”).

173. *Miller*, 567 U.S. at 471–72 (citations omitted).

174. Federle & Skendelas, *supra* note 172, at 199.

175. Keramet Reiter, *Lessons and Liabilities in Litigating Solitary Confinement*, 48 CONN. L. REV. 1167, 1170 (2016).



*v. Ayala*, “Justice Kennedy concluded with an invitation to prisoners and their advocates to bring a case to challenge . . . the practice of solitary confinement.”<sup>176</sup>

Although Justice Kennedy is no longer on the Supreme Court, scholars and scientists alike have nonetheless recognized that neuroscience may be a valuable tool to support constitutional challenges to the practice of solitary confinement.<sup>177</sup> For instance, reflecting on how neuroscience might affect the law, psychologists Arielle Baskin-Sommers and Karelle Fonteneau have suggested that “[t]he first area in which findings from neuroscience may be applied to affect correctional change is with regard to the excessive and unrestricted use of segregation or solitary confinement.”<sup>178</sup> Baskin-Sommers and Fonteneau suggest that a combination of nonhuman primate studies,<sup>179</sup> together with neuroscience research on the effects of social isolation on orphans, “suggest that increased social isolation and diminished physical contact contribute to and reinforce problematic neurobiological patterns.”<sup>180</sup> They conclude that the use of solitary confinement “increases the likelihood of negative effects on the brain and psychological health.”<sup>181</sup>

Neuroscientist Huda Akil has made a similar argument. Writing with law professor Jules Lobel, Akil argues that neuroscience may break down the currently held distinction between physical and mental injury.<sup>182</sup> In doing so, neuroscience may “provide novel

176. *Id.* at 1173–74 (interpreting Justice Kennedy’s concurrence in *Davis v. Ayala*, 135 S. Ct. 2187, 2210 (2015), in which he said, “In a case that presented the issue, the judiciary may be required, within its proper jurisdiction and authority, to determine whether workable alternative systems for long-term confinement exist, and, if so, whether a correctional system should be required to adopt them.”).

177. See Jules Lobel & Huda Akil, *Law & Neuroscience: The Case of Solitary Confinement*, 147 DAEDALUS J. AM. ACAD. ARTS & SCI. 61, 61 (2018); Eric Ordway et al., *The United States Supreme Court Case Ziglar v. Abbasi and the Severe Psychological and Physiological Harms of Solitary Confinement*, 27 TORTURE 79, 83–84 (2017); Atul Gawande, *Hellhole*, NEW YORKER (Mar. 30, 2009), <https://www.newyorker.com/magazine/2009/03/30/hellhole> [<https://perma.cc/26CR-HXJC>].

178. Arielle R. Baskin-Sommers & Karelle Fonteneau, *Correctional Change Through Neuroscience*, 85 FORDHAM L. REV. 423, 425 (2016).

179. *Id.* at 427–28; see also *infra* Section II.B.2.

180. Baskin-Sommers & Fonteneau, *supra* note 178, at 428.

181. *Id.* at 429.

182. Lobel & Akil, *supra* note 177, at 63. The Author has similarly argued in previous work “that classification of ‘mental’ harms as wholly distinct from ‘physical’ harms is problematic in light of modern neuroscientific understanding of the relationship between mind and brain.” Francis X. Shen, *Sentencing Enhancement and the Crime Victim’s Brain*, 46 LOY. U. CHI. L.J. 405, 406 (2014); see also Francis X. Shen, *Mind, Body, and the Criminal Law*, 97 MINN. L. REV. 2036, 2038 (2013).

perspectives that may be impactful on legal decisions and legal thought.”<sup>183</sup>

Given this enthusiasm for neuroscience in solitary confinement litigation, advocates in several recent cases have added it to their litigation strategy. A prominent example is *Ashker v. Brown*, a federal class action lawsuit in California brought by a class of prisoners held in the Security Housing Unit (SHU) at California’s Pelican Bay State Prison. In *Ashker*, each prisoner spent ten years or more in solitary confinement.<sup>184</sup> After many years of litigation, the case reached a settlement in 2015.<sup>185</sup> Recognized as a “landmark settlement,” the agreement ended indefinite solitary confinement for gang validation and minor rule infractions.<sup>186</sup>

*Ashker* was notable for its utilization of brain experts. Matthew Lieberman, a neuroscientist at the University of California, Los Angeles, filed an expert report on behalf of the plaintiffs in 2015.<sup>187</sup> Lieberman argued that humans have a basic need for “social connection,” and that the social pain of isolation is “registered by the brain as a type of genuine pain, just as any other forms of physical pain are.”<sup>188</sup> Dacher Keltner, a psychologist at University of California, Berkeley, also filed an expert report that relied heavily on the brain science of touch.<sup>189</sup> Keltner argued that a lack of touch has detrimental physiological effects on inmates’ brains and bodies.<sup>190</sup>

It is not possible to isolate the specific added value from neuroscience’s role in the *Ashker* settlement. Other factors, such as multiple hunger strikes and much additional (nonbrain) evidence on the conditions and effects of solitary confinement surely played a significant role as well. Yet it seems plausible that the neuroscience contributed, at least marginally and perhaps more substantially, in shaping the settlement’s dialogue.

183. Lobel & Akil, *supra* note 177, at 71.

184. *Ashker v. Brown*, No. 4:09-cv-05796-CW, 2013 WL 1435148, at \*2, \*5–6 (N.D. Cal. Apr. 9, 2013).

185. See Settlement Agreement at 4, *Ashker v. Governor of Cal.*, No. 4:09-cv-05796-CW, 2014 WL 2465191 (N.D. Cal. June 2, 2014); Reiter, *supra* note 175, at 1169.

186. Lisa Guenther, *Unmaking and Remaking the World in Long-Term Solitary Confinement*, 1 PUNCTA J. CRITICAL PHENOMENOLOGY 74, 74–75 (2018).

187. See Expert Report of Matthew D. Lieberman at 5, *Ashker v. Governor of Cal.*, No. 4:09-cv-05796 CW, 2014 WL 2465191 (stating that social pain is akin to sleep and exercise deprivation in that none would kill you immediately, but the brain will show evidence of deprivation over time).

188. *Id.* at 10.

189. Expert Report of Dr. Dacher Keltner, Ph.D. at 3, *Ashker v. Governor of Cal.*, No. 4:09-cv-05796-CW, 2014 WL 2465191.

190. *Id.* at 11.

Additional cases have also utilized neuroscience. Another example is *Ziglar v. Abbasi*.<sup>191</sup> Although ultimately dismissed on procedural grounds, the case is notable because of a brief filed by a prominent group of doctors and scientists, including experts from the World Health Organization and a member of the UN Subcommittee for the Prevention of Torture.<sup>192</sup> The brief referenced the results of EEG testing, which showed that a few days of solitary confinement shifted the EEG pattern to that of stupor and delirium.<sup>193</sup> The brief also referenced a neurobiological study on the effects of sensory deprivation and isolation in people that demonstrated reduced size in certain brain regions, consistent with similar studies on other mammals.<sup>194</sup> This neurological damage could very well be irreversible if prolonged.<sup>195</sup>

Changes to brain functioning were also recognized in a 2018 case before the US Court of Appeals for the Tenth Circuit that held an inmate who was arbitrarily subjected to twenty years of solitary confinement was denied his due process rights.<sup>196</sup> Notably, when describing the effects of solitary confinement, the concurring opinion made direct reference to brain changes, and even cited to scientific literature to support its claims:

Physically, symptoms of extended solitary confinement include heart palpitations, headaches, hypertension, and weight loss. Peter Scharff Smith, *The Effects of Solitary Confinement on Prison Inmates: A Brief History and Review of the Literature*, 34 *Crime & Just.* 441, 488-93 (2006). Individuals subject to solitary confinement show significant changes in brain activity. Elizabeth Bennion, *Banning the Bing: Why Extreme Solitary Confinement Is Cruel & Far Too Usual Punishment*, 90 *Ind. L.J.* 741, 757-59 (2015) (summarizing documented changes in brain activity after solitary confinement); Stuart Grassian, *Psychiatric Effects of Solitary Confinement*, 22 *Wash. U. J.L. & Pol'y* 325, 330-31 (2006) (observing abnormal brain patterns in people exposed to solitary confinement). In sum, solitary confinement rewires the prisoner's brain, physically changing the way the organ functions.<sup>197</sup>

The concurrence went on to conclude that “[g]iven our society’s present understanding that prolonged solitary confinement inflicts progressive

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191. *Ziglar v. Abbasi*, 137 S. Ct. 1843, 1843 (2017); see Eric Ordway et al., *supra* note 177, at 83–84.

192. See *Ziglar*, 137 S. Ct. at 1869; Brief of Medical and Other Scientific and Health-Related Professionals as Amici Curiae in Support of Respondents and Affirmance at 1, *Ziglar v. Abbasi*, 137 S. Ct. 1843 (Nos. 15-1358, 15-1359 and 15-1363) [hereinafter *Brief of Medical, Scientific, and Health Professionals*].

193. *Brief of Medical, Scientific, and Health Professionals*, *supra* note 192, at 24.

194. *Id.* at 25.

195. *Id.* at 26.

196. See *Grissom v. Roberts*, 902 F.3d 1162, 1175–76 (10th Cir. 2018) (Lucero, J., concurring) (“[S]olitary confinement rewires the prisoner’s brain, physically changing the way the organ functions.”). This inmate filed suit challenging his solitary confinement twice. *Id.* at 1166.

197. *Id.* at 1176.

brain injury, we cannot consider such prolonged, unjustified confinement as anything other than extreme and atypical.”<sup>198</sup>

Despite this acknowledgement of brain injury, summary judgment was still granted against the appellee because the court found the prison officials were entitled to qualified immunity.<sup>199</sup> In short, the conditions were not so bad as to put the officials on notice that they were clearly violating the established law.<sup>200</sup> This is another challenge of brain injuries. Because they are not visible to the naked eye, it is difficult to prove that a prison official should have been on notice that a prisoner had mental suffering. Contrast this to an injury that resulted in visible bleeding. If every day a prison guard saw blood coming out of the inmate’s head, surely this would put the guard on notice that medical attention was warranted. If brain data can one day provide a similarly clear indicator of brain health, it may help inmates proffer evidence that the guards subjectively knew of the inmate’s mental health challenges.

The future of neuroscience in solitary confinement litigation is uncertain. Brain science evidence is increasingly being proffered to support legal challenges to solitary confinement. But, at least in the short term, neuroscience can only speculate about how inmates’ brains are actually changing. As contrasted with the large number of neuroscientific studies of the adolescent brain, there are no research studies directly measuring human brain changes in response to isolation in prisons.<sup>201</sup> As Akil wrote, to carry out a scientifically robust study would require measuring brain data from both inmates in solitary and comparable inmates in regular detention:

To be certain that such changes were associated with isolation and not with prison life in general, similar observations of well-matched control subjects (of similar age, sex, mental ability, and ideally criminal offense history) would have to be taken over the same period of time. An additional control group of subjects equally well-matched on crucial variables but not incarcerated would also be useful since this would enable the parsing of the effects of the general stress of prison life from the additional impact of social isolation, physical inactivity, and other distresses of solitary housing.<sup>202</sup>

The control group is especially important because all incarceration, even if not “solitary,” is isolating compared to civilian life.

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198. *Id.* at 1177.

199. *Id.* at 1172.

200. *Id.* at 1168, 1172.

201. See Lobel & Akil, *supra* note 177, at 67.

202. *Id.* at 68. Lobel and Akil also note an alternative: “Absent the basal data, a less optimal cross-sectional design could be used, but it would require a larger number of prisoners in order to enable either the two-way or three-way comparison.” *Id.*

Even if group-averaged data on the effects of solitary confinement were available, there might still be the problem of individuation—attempting to apply an inference found in group studies to an individual—which has arisen in other areas of neurolaw.<sup>203</sup> Even if solitary confinement is harmful, on average, to the human brain, how would one know if any one individual inmate's brain was negatively affected? This would require individualized brain data, which at present would be virtually impossible to obtain.

Future developments in neurotechnology may offer promise. For instance, the National Institutes of Health Brain Research through Advancing Innovative Neurotechnologies (BRAIN) initiative is currently funding research to develop highly mobile brain scanning technology.<sup>204</sup> Such technology could one day allow for regular brain assessments of inmates, including those in solitary confinement.<sup>205</sup> But until this or similar technology can be deployed, litigators will be left to rely upon circumstantial evidence generated by research on nonhuman animals. Given the trajectory of case law—which has found even deplorable conditions constitutional—the current neuroscientific evidence base may not be enough to fundamentally alter courts' calculus. That is not to say that the brain evidence is not important and that it will not get better, but rather to say that at present brain evidence is unlikely to be tip the scales of solitary confinement litigation.

#### V. CAN NEUROSCIENCE SWAY SOLITARY CONFINEMENT SKEPTICS?: NEW EVIDENCE

In addition to appearing in courts to persuade judges, neuroscience is now also used in the legislative and policymaking process to persuade legislators and the public that elects them.<sup>206</sup> It remains unclear, however, whether neuroscience in legislative arenas simply reinforces previously held positions or persuades those who hold

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203. David L. Faigman et al., *Group to Individual (G2i) Inference in Scientific Expert Testimony*, 81 U. CHI. L. REV. 417, 417 (2014).

204. MICHAEL G. GARWOOD & JOHN T. VAUGHAN, UNIV. OF MINN. TWIN CITIES, IMAGING BRAIN FUNCTION IN REAL WORLD ENVIRONMENTS & POPULATIONS WITH PORTABLE MRI (2014), <http://grantome.com/grant/NIH/R24-MH105998-02S1> [<https://perma.cc/PV75-PPVX>]. The Author is an embedded neuroethics scholar in this Garwood project, as of May 2019.

205. Neuroimaging might be introduced as part of a mental health evaluation. Larger-scale research on inmates using neuroimaging would require clearance from applicable human subjects review boards. *See id.*

206. Francis X. Shen, *Neurolegislation: How U.S. Legislators Are Using Brain Science*, 29 HARV. J.L. & TECH. 495, 497 (2016).

opposing views.<sup>207</sup> Nevertheless, there is some evidence that in the realm of juvenile justice policymaking, neuroscience has played a significant role in modifying sentencing regimes.<sup>208</sup>

These developments in juvenile justice policy raise the question: Might neuroscience be effective evidence in changing public opinion on solitary confinement? Public opinion is a relevant consideration to this Article's analysis because "[p]ublic opinion plays an important role in criminal justice policy-making."<sup>209</sup> Changes in public opinion on the use of solitary confinement could conceivably change legislative priorities and action.<sup>210</sup>

To see how neuroscience might affect public support for solitary confinement, an original survey experiment was conducted with a sample of ideologically conservative subjects. The experiment finds a statistically significant, but not large in magnitude, relationship between neuroscience evidence and impact in changing conservative attitudes on solitary confinement.

Section V.A reviews the existing literature on public support for solitary confinement. Section V.B provides context by briefly introducing the empirical literature exploring the effects of neuroscience on legal outcomes and public opinion. Section V.C introduces the methodological details of my new experiment, which contributes to this literature. Section V.D presents the experimental results and discusses their implications for solitary confinement advocacy.

### *A. Public Support for Solitary Confinement*

Although legal scholarship has been quite critical of solitary confinement, the US public does not share the same skepticism. Americans generally support the use of solitary confinement, although the level of that support varies across survey methodologies and question wording. There are also noted differences in support by age, gender, race, and political partisanship. As reviewed below,

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207. *Id.* at 519 ("[W]hile brain science is mentioned in an increasing number of policy domains, it seems to reinforce rather than revolutionize legislators' policy commitments.").

208. Francis X. Shen, *Legislating Neuroscience: The Case of Juvenile Justice*, 46 LOY. L.A. L. REV. 985, 996 (2013).

209. JULIAN V. ROBERTS & LORETTA J. STALANS, PUBLIC OPINION, CRIME, AND CRIMINAL JUSTICE 6 (2000).

210. The study reported here is not intended to speak to how judges would be influenced (or not) by neuroscience. Nor am I suggesting that public opinion would necessarily bear on a judge's analysis. My interest in analyzing public opinion is related to the possibility that it might affect legislative activity.

conservatives tend to view solitary confinement more favorably than Democrats.

Few scholarly articles review public perceptions and support of solitary confinement in the United States or beyond, despite the continuance of the practice and the failure to gain sufficient support for alternative solutions on behalf of policymakers.<sup>211</sup> The best available data comes from criminologist Daniel Mears, who conducted a telephone survey of 1,308 randomly sampled Floridians in 2006.<sup>212</sup> Participants were given a description of supermax security prisons<sup>213</sup> and asked three questions to gauge their support for supermax.<sup>214</sup>

Mears found that 82 percent of respondents supported supermax prisons, though support dropped to 61 percent when the question indicated that supermax prisons provide no “crime-reduction benefit to society.”<sup>215</sup> Seventy-one percent of respondents *disagreed* with the assertion that supermax prisons were inhumane to incarcerated individuals.<sup>216</sup>

But support varied over demographics. White respondents, older respondents, respondents within the margins of poverty, male respondents, and conservative respondents were significantly more likely to support the use of supermax prisons.<sup>217</sup> Discussing the findings, Mears observed that support for solitary confinement was “positively associated with those groups typically most concerned with symbolic threats . . . and those most likely to locate agency in individuals rather than in relationships or circumstances (e.g., males, political conservatives, and retributivists).”<sup>218</sup>

211. Daniel P. Mears et al., *Housing for the “Worst of the Worst” Inmates: Public Support for Supermax Prisons*, 59 CRIME & DELINQ. 587, 589 (2013).

212. *Id.* at 597.

213. *Id.* at 598 (“Super-maximum security prisons are facilities where certain inmates are housed indefinitely—by themselves—for 23 hours per day. The inmates typically have few if any opportunities to receive programs, treatment, or visitors. Supermaxes generally cost two to three times more to build and to operate than other prisons.”).

214. *Id.* The exact question wording was “[h]ow much do you support the use of supermax prisons to handle inmates who are disruptive, violent, or difficult to manage? (1 = *strongly oppose*, 4 = *strongly support*),” “[i]f the only benefit of supermax prisons was to help prison officials manage inmates—and not to reduce crime in society—how much would you support having supermaxes?” (same scale as above), and “[h]ow much do you agree that placing inmates in a supermax type of prison is inhumane?” (1 = *strongly agree*, 4 = *strongly disagree*). *Id.* at 598–600.

215. *Id.* at 600–02.

216. *Id.* at 602.

217. *Id.*

218. *Id.* at 607. These relationships remained significant after controlling for their views on prison humaneness and their “punishment philosophy,” such the respondent’s view of personal agency and the context of one’s environment when assessing responsibility for a crime. The relationships are consistent with data from a 2013 YouGov poll. See YOUGov (2013),

Additional data on support for solitary confinement comes from a Massachusetts poll conducted in 2017 by MassINC.<sup>219</sup> This poll revealed that when respondents were told that research shows that solitary confinement can produce “lasting mental damage” and that solitary confinement may be “necessary to deal with disruptive and dangerous prisoners, and to protect possibly suicidal individuals,”<sup>220</sup> 52 percent of respondents indicated that they supported the use of solitary confinement while 43 percent opposed the practice.<sup>221</sup>

### *B. Literature Review: The Effect of Brain Evidence on Public Opinion*

Might brain evidence be effective in changing the public’s support for solitary confinement? To answer this question, it is important to first review the literature on the effects of brain evidence on opinions and legal outcomes. Scholars have voiced concern that neuroscientific evidence has the potential to exert a “seductive allure” over other forms of nonbrain evidence.<sup>222</sup> A summary of over twenty-nine studies in a recently published article found that the effects of neuroscience evidence has been mixed.<sup>223</sup>

Some studies have confirmed the “seductive allure” hypothesis,<sup>224</sup> whether it be through perception of higher quality

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[http://cdn.yougov.com/cumulus\\_uploads/document/52tc9shubr/tabs\\_OPI\\_crime\\_20131007.pdf](http://cdn.yougov.com/cumulus_uploads/document/52tc9shubr/tabs_OPI_crime_20131007.pdf)  
[<https://perma.cc/BKS4-CJLW>].

219. STEVE KOCZELA & RICH PARR, MASSINC, PUBLIC OPINION ON CRIMINAL JUSTICE REFORM IN MASSACHUSETTS 1 (2017), <https://massinc.org/wp-content/uploads/2017/06/Public-Opinion-on-Criminal-Justice-Reform-in-Massachusetts.pdf> [<https://perma.cc/D6LV-DF9H>].

220. *Id.* at 10. The exact question that was used was “[s]olitary confinement is the practice where some prisoners are locked in rooms by themselves for twenty-two to twenty-three hours per day. Supporters say it is necessary as a way to separate disruptive or dangerous prisoners apart from the rest of the population and to keep potentially suicidal prisoners safe. Opponents say the practice is cruel, unnecessary, and can cause lasting mental damage to prisoners. Do you favor or oppose the use of solitary confinement in Massachusetts prisons? And is that strongly (favor/oppose) or just somewhat?” The choices ranged from strongly favor to strongly oppose, with an option to abstain. *Id.*

221. *Id.* MassINC did not break out the data by demographics and partisan affiliations. *See id.*

222. Deena Skolnick Weisberg et al., *The Seductive Allure of Neuroscience Explanations*, 20 J. COGNITIVE NEUROSCIENCE 470, 470 (2008).

223. Francis X. Shen et al., *The Limited Effect of Electroencephalography Memory Recognition Evidence on Assessments of Defendant Credibility*, 4 J.L. & BIOSCIENCES 330, 332 (2017).

224. Diego Fernandez-Duque et al., *Superfluous Neuroscience Information Makes Explanations of Psychological Phenomena More Appealing*, 27 J. COGNITIVE NEUROSCIENCE 926, 926 (2015); Edie Greene & Brian S. Cahill, *Effects of Neuroimaging Evidence on Mock Juror Decision Making*, 30 BEHAV. SCI. & L. 280, 294 (2012); Madeleine Keehner, Lisa Mayberry & Martin H. Fischer, *Different Clues from Different Views: The Role of Image Format in Public Perceptions of Neuroimaging Results*, 18 PSYCHONOMIC BULL. & REV. 422, 426 (2011); Rebecca E.



scientific information<sup>225</sup> or through more lenient sentencing for criminals.<sup>226</sup> Other studies have unveiled counterintuitive or contextual findings across different participant populations,<sup>227</sup> evaluation metrics,<sup>228</sup> or in combination with other types of evidence.<sup>229</sup> Certain studies have failed to observe significant or meaningful differences in lay or legal decision-making due to neuroscientific evidence as compared to other types of evidence,<sup>230</sup> and yet others have even observed a “backfire effect” of such evidence.<sup>231</sup> As such, it appears that the consensus on the effect of neuroscientific evidence on decisions is that there is no consensus, and that such effects lie partly within the realm of the nature and consequences of the decision.

For the purposes of this Article, it is sufficient to note that there is a possibility that neuroscience may affect opinions on solitary confinement, but that it is only a possibility. It requires empirical testing, which is the subject of the following Section.

### C. A New Experiment: Methods

#### 1. Research Design

To explore the effect of neuroscientific evidence on conservatives’ support for solitary confinement, a modified version of the survey question used by MassINC in 2017 was employed. The MassINC survey asked all subjects the following question:

Solitary confinement is the practice where some prisoners are locked in rooms by themselves for 22 to 23 hours per day. Supporters say it is necessary as a way to

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Rhodes, Fernando Rodriguez & Priti Shah, *Explaining the Alluring Influence of Neuroscience Information on Scientific Reasoning*, 40 J. EXPERIMENTAL PSYCHOL. 1432, 1438 (2014).

225. Rhodes, Rodriguez & Shah, *supra* note 224, at 1438.

226. Lisa G. Aspinwall, Teneille R. Brown & James Tabery, *The Double-Edged Sword: Does Biomechanism Increase or Decrease Judges’ Sentencing of Psychopaths?*, 337 SCIENCE 846, 846 (2012); Greene & Cahill, *supra* note 224, at 292–93.

227. Weisberg et al., *supra* note 222, at 477.

228. Rhodes, Rodriguez & Shah, *supra* note 224, at 1432.

229. David P. McCabe et al., *The Influence of fMRI Lie Detection Evidence on Juror Decision-Making*, 29 BEHAV. SCI. & L. 566, 566 (2011); N. J. Schweitzer et al., *Neuroimages as Evidence in a Mens Rea Defense: No Impact*, 17 PSYCHOL. PUB. POL’Y & L. 357, 357 (2011).

230. D. A. Baker et al., *Visual Attention and the Neuroimage Bias*, 8 PLOS ONE e74449, at 1, 5 (2013); David Gruber & Jacob A. Dickerson, *Persuasive Images in Popular Science: Testing Judgments of Scientific Reasoning and Credibility*, 21 PUB. UNDERSTANDING SCI. 938, 944 (2012); N. J. Schweitzer, Denise A. Baker & Evan F. Risko, *Fooled by the Brain: Re-Examining the Influence of Neuroimages*, 129 COGNITION 501, 508 (2013); Francis X. Shen, *Monetizing Memory Science: Neuroscience and the Future of PTSD Litigation*, in MEMORY AND LAW 325, 346 (Lynn Nadel & Walter P. Sinnott-Armstrong eds., 2012).

231. Michael J. Saks et al., *The Impact of Neuroimages in the Sentencing Phase of Capital Trials*, 11 J. EMPIRICAL LEGAL STUD. 105, 105 (2014).

separate disruptive or dangerous prisoners apart from the rest of the population and to keep potentially suicidal prisoners safe. Opponents say the practice is cruel, unnecessary, and can cause lasting mental damage to prisoners.

Do you favor or oppose the use of solitary confinement in prisons?

Building on this question wording, I randomly assigned subjects into one of five groups:

1. *Control Group*. Subjects were asked the identical question above and not provided any further additional information.

2. *Brain Injury Group*. Subjects in this group were provided with this additional information: "New neuroscience research suggests that solitary confinement leads to permanent physical changes in the brain cells of most inmates in solitary confinement. Images from brain scanning technology confirm that circuits in these brains are negatively affected by solitary confinement."

3. *No Brain Injury Group*. Subjects in this group were provided with this additional information: "New neuroscience research suggests that solitary confinement does not lead to permanent physical changes in the brain cells of most inmates in solitary confinement. Images from brain scanning technology confirm that circuits in these brains are not negatively affected by solitary confinement."

4. *Leg Injury Group*. Subjects in this group were provided with this additional information: "New medical research suggests that solitary confinement leads to permanent physical changes in the leg muscle cells of most inmates in solitary confinement. Images from leg scanning technology confirm that muscle cells in the leg are negatively affected by solitary confinement."

5. *No Leg Injury Group*. Subjects in this group were provided with this additional information: "New medical research suggests that solitary confinement does not lead to permanent physical changes in the leg muscle cells of most inmates in solitary confinement. Images from leg scanning technology confirm that muscle cells in the leg are not negatively affected by solitary confinement."

The leg injury conditions were added in order to see whether the effects on support are due to brain-specific information versus medical information more generally. The "no injury" conditions were added in order to explore the possibility of a neuroscience "double-edged sword," as identified by previous scholarship.<sup>232</sup> Just as evidence of brain injury might be advantageous for litigators, a lack of evidence of brain injury might run counter to advocacy objectives.

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232. Aspinwall, Brown & Tabery, *supra* note 226, at 846.

## 2. Study Participants

The experiment was conducted online utilizing a web-based platform called Qualtrics. Qualtrics has established itself as a trusted host for a variety of experimental studies, including empirical legal studies.<sup>233</sup> Online subjects were recruited to the Qualtrics-hosted experiment via modest payments at market rates made available through Amazon Mechanical Turk's (MTurk) payment service.<sup>234</sup> No personally identifying information was collected. Studies assessing the quality of MTurk subjects have found them to be engaged by the online experimental stimuli and to be significantly more representative than the convenience samples that would otherwise be used.<sup>235</sup> While not the gold standard of a truly nationally representative (but prohibitively costly) sample, MTurk nonetheless provides high-quality, low-cost subjects.

MTurk also allows the researcher to specify filters for participants. In addition to restricting my sample to American adults, I added a filter for political conservatives. This allowed me to target my experiment at the group most likely to oppose solitary confinement.<sup>236</sup>

In this study 286 subjects, all reporting being politically conservative, completed the task. However, an "attention filter" question was used to identify those subjects who actually engaged in

233. See, e.g., Dino P. Christenson & David M. Glick, *Crowdsourcing Panel Studies and Real-Time Experiments in MTurk*, 20 POL. METHODOLOGIST 27, 31 (2013). Research combining Amazon Mechanical Turk and Qualtrics is now routine in the social sciences. *Id.* at 27. Research using Qualtrics-based experiments has been published and presented in a number of academic fields, suggesting that it meets scholarly expectations for quality online, web-based experiments. Legal studies relying on Qualtrics experiments include: Matthew R. Ginther et al., *The Language of Mens Rea*, 67 VAND. L. REV. 1327, 1349 (2014); Elizabeth Ingriselli, *Mitigating Jurors' Racial Biases: The Effects of Content and Timing of Jury Instructions*, 124 YALE L.J. 1690, 1723 (2015); Jeff Sovern et al., *"Whimsy Little Contracts" with Unexpected Consequences: An Empirical Analysis of Consumer Understanding of Arbitration Agreements*, 75 MD. L. REV. 1, 26 (2015).

234. No personally identifying information was collected aside from a thirteen-character identification number provided by the worker for the purposes of tracking survey completion, obtaining payment, and preventing the same individual from completing the same or related surveys.

235. See, e.g., Tara S. Behrend et al., *The Viability of Crowdsourcing for Survey Research*, 43 BEHAV. RES. METHODS 800, 802 (2011); Adam J. Berinsky et al., *Evaluating Online Labor Markets for Experimental Research: Amazon.com's Mechanical Turk*, 20 POL. ANALYSIS 351, 352 (2012); Michael D. Buhrmester, Tracy Kwang & Samuel D. Gosling, *Amazon's Mechanical Turk: A New Source of Inexpensive, yet High-Quality, Data?*, 6 PERSP. ON PSYCHOL. SCI. 3, 4 (2011); Joseph K. Goodman, Cynthia E. Cryder & Amar Cheema, *Data Collection in a Flat World: The Strengths and Weaknesses of Mechanical Turk Samples*, 26 J. BEHAV. DECISION MAKING 213, 214 (2012); Jon Sprouse, *A Validation of Amazon Mechanical Turk for the Collection of Acceptability Judgments in Linguistic Theory*, 43 BEHAV. RES. METHODS 155, 164–65 (2010).

236. Ongoing work is exploring the extent to which different patterns are observed for liberals and independents.

the online task. Concerns about subjects' compliance with task instructions are of special concern with online experiments because subjects cannot be monitored while engaged in the experimental tasks. To address this issue, experimental psychologists have developed attention filters designed to ascertain whether subjects are in fact following instructions and paying attention to the material being presented to them online. In each of the experiments, I employed a modified version of the filter developed by psychologist Daniel Oppenheimer and his colleagues.<sup>237</sup>

The design of the primary attention filter question was such that users would see, in large font, a headline reading "Background Questions on Sources for News" as well as another large, bold question: "From which of these sources have you received information in the past month?" A series of check-box options were provided (e.g., local newspaper, local TV news). Subjects reading carefully, however, were instructed not to check any of the boxes, but instead to type "789" into the provided text box.

Eighty-seven percent (250 of 286) of subjects successfully answered the attention filter question. This is a similar attention rate to other studies using online subjects.<sup>238</sup> The results presented in this Article are based only on those 250 subjects who paid attention as assessed by this attention filter. The sample was 49 percent female, 54 percent with college degree, and predominantly white. The average age of participants was 44.5 years old, with a standard deviation of 12.9.<sup>239</sup>

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237. See Daniel M. Oppenheimer, Tom Meyvis & Nicolas Davidenko, *Instructional Manipulation Checks: Detecting Satisficing to Increase Statistical Power*, 45 J. EXPERIMENTAL SOC. PSYCHOL. 867, 867–68 (2009) (describing a filter in which subjects must carefully read instructions which, counter to the boldface headline above the instructions, tell subjects not to actually click on an answer to the question).

238. See, e.g., Goodman, Cryder & Cheema, *supra* note 235, at 217. Research suggests that MTurk subjects are more attentive than subjects obtained through other population sampling methods, such as college students. See David J. Hauser & Norbert Schwarz, *Attentive Turkers: MTurk Participants Perform Better on Online Attention Checks than Do Subject Pool Participants*, 48 BEHAV. RES. METHODS 400, 405–06 (2016). However, other research has failed to find a significant difference between MTurk and other groups. See Gabriele Paolacci, Jesse Chandler & Panagiotis G. Ipeirotis, *Running Experiments on Amazon Mechanical Turk*, 5 JUDGMENT & DECISION MAKING 411, 417 (2010). Other research has found few differences, outside of demographic and age differences, between MTurk and other sampling groups, and that MTurk data is actually of higher quality in terms of quicker response times (though not too quick as to indicate poor comprehension), higher attention (measured through a vignette), and fewer nonresponses to survey items. Jill D. Weinberg, Jeremy Freese & David McElhatten, *Comparing Data Characteristics and Results of an Online Factorial Survey Between a Population-Based and a Crowdsourcing-Recruited Sample*, 1 SOC. SCI. 292, 308 (2014).

239. Census data from 2010 show that the US population is 50.8 percent female, 75.7 percent white non-Hispanic, 30.9 percent with a college degree or higher, and 37.8 years of age, on

The subject pool was national, with representation from forty-four different states.

#### *D. Results and Discussion*

Conservatives' support for solitary confinement varies as a function of receiving information about the detrimental effects of confinement on inmates (Figure 1). At baseline, when provided with the same prompt as used in the 2017 MassINC survey, nearly 75 percent of conservatives voice support for solitary confinement.<sup>240</sup>

The first notable finding is that there is no statistically significant difference between baseline support and the no brain injury condition,<sup>241</sup> and similarly no statistically significant difference between baseline support and the no leg injury condition.<sup>242</sup> In the no brain injury condition, there is 81 percent support, and in the no leg injury condition there is 71 percent support. In short, the baseline assumption of these conservative participants in the study seems to be that there are no physical injuries caused by solitary confinement.

The second notable finding is that there is a statistically significant difference between baseline support and the leg injury condition,<sup>243</sup> but no statistically significant difference between baseline support and the brain injury condition.<sup>244</sup> As compared to the 75 percent baseline level of support, only 54 percent of subjects who learned that solitary causes leg injury supported solitary confinement. Sixty-three percent of subjects who learned that solitary causes brain injury supported solitary confinement.

Why would subjects who were told that solitary confinement caused a *leg* injury be less supportive than subjects who were told that solitary confinement caused a *brain* injury? One possibility may be a hesitation to recognize brain injuries as real, physical injuries. In a

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average. *Decennial Census of Population and Housing*, U.S. CENSUS BUREAU, <https://www.census.gov/programs-surveys/decennial-census/decade.2010.html> [<https://perma.cc/6SJP-NN6Z>] (last visited Mar. 5, 2019).

240. See *infra* Figure 1. Support in the MassInc 2017 survey was 52 percent, but this included survey respondents from all political ideologies. MassInc did not break out the data by partisan affiliation. See KOCZELA & PARR, *supra* note 219.

241. See *infra* fig. 1.  $\chi^2(1) = 2.24$ ,  $p = 0.13$ .

242. See *infra* fig. 1.  $\chi^2(1) = .07$ ,  $p = 0.79$ .

243. See *infra* fig. 1.  $\chi^2(1) = 1.95$ ,  $p = 0.16$ .

244. See *infra* fig. 1.  $\chi^2(1) = 3.90$ ,  $p < 0.05$ .

variety of legal contexts, such as tort law,<sup>245</sup> insurance law,<sup>246</sup> and criminal sentencing,<sup>247</sup> the law treats “bodily” injuries as distinct from “mental” injuries. This mind-body dualism has been rejected by neuroscientists,<sup>248</sup> but persists in the law.<sup>249</sup> Empirical evidence also suggests that the lay public is more hesitant to view mental injuries as physical. A previous study I conducted on how lay subjects categorize injuries as either “bodily” or “mental” found that leg injuries were more often labeled by subjects as physical than injuries such as post-traumatic stress disorder (PTSD), depression, and memory loss.<sup>250</sup>

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245. Betsy J. Grey, *Neuroscience and Emotional Harm in Tort Law: Rethinking the American Approach to Free-Standing Emotional Distress Claims*, in *LAW AND NEUROSCIENCE: CURRENT LEGAL ISSUES* 203, 203 (Michael Freeman ed., 2010); Betsy J. Grey, *Neuroscience, Emotional Harm, and Emotional Distress Tort Claims*, 7 *AM. J. BIOETHICS* 65, 65 (2007).

246. Stacey A. Tovino, *Neuroscience and Health Law: An Integrative Approach?*, 42 *AKRON L. REV.* 469, 489 (2009).

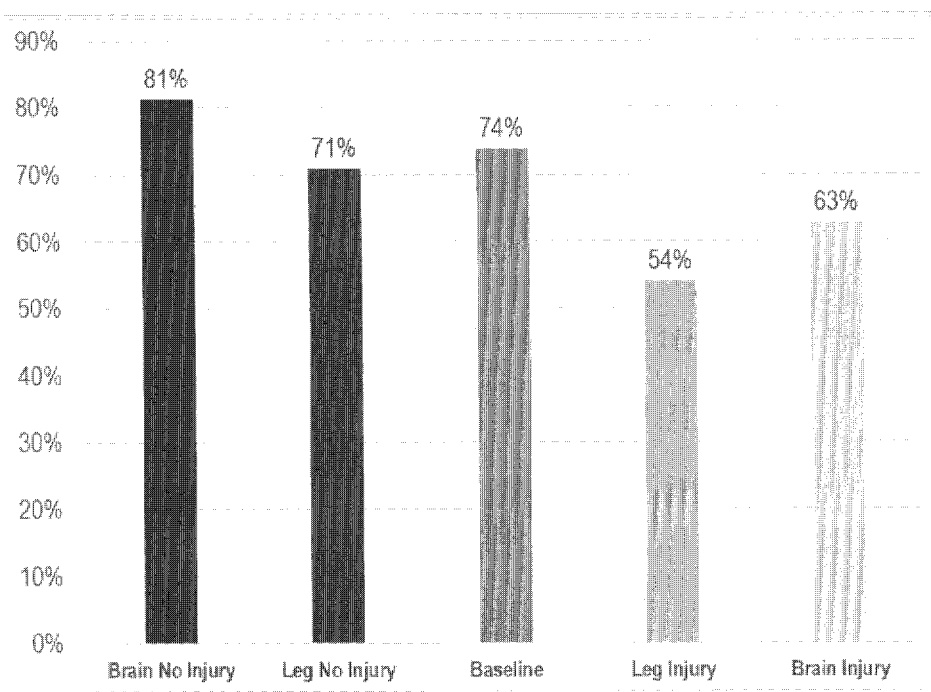
247. Francis X. Shen, *Sentencing Enhancement and the Crime Victim's Brain*, 46 *LOY. U. CHI. L.J.* 405, 406 (2014).

248. *Id.* at 418 (discussing the “scientific consensus that dualism is no longer a viable theory”).

249. Francis X. Shen, *Mind, Body, and the Criminal Law*, 97 *MINN. L. REV.* 2036, 2038 (2013).

250. *Id.* at 2077.

**Figure 1. Conservative Support for Solitary Confinement, by Experimental Condition**



*What to Note in Figure 1:* Figure 1 plots the percentage of subjects in each experimental treatment group who reported either somewhat favoring or strongly favoring the use of solitary confinement. There are two things to notice. First, support is lower in each of the two treatment groups where subjects were told that research found solitary confinement leads to an injury (leg and brain). But the magnitude of this difference is such that a majority of respondents still support solitary confinement even when they are told it causes an injury. Second, the baseline support is not significantly different from the treatment conditions where subjects were told that research found no injury caused by solitary confinement. This suggests that, for these conservative subjects, the baseline assumption is that solitary confinement does not cause physical injury.

It should be emphasized that this experiment is a single experiment, providing subjects with a small amount of information. It could be the case, for instance, that brain evidence may be particularly persuasive for certain groups (e.g., juveniles or those with mental illnesses). Public opinion in the real world is contingent on a multitude

of other factors, and the relationship between public opinion and policy reform is complex.<sup>251</sup> Whether brain science might have a different effect if presented more vividly, or less of an effect if countered with other evidence, are open questions that must be left to subsequent studies.

Nevertheless, the data clearly suggest that there are limits to what brain data can do in terms of changing conservatives' support for solitary confinement. In addition to the lack of a significant relationship between the brain injury condition and support for solitary confinement, it is also important to observe in both the leg injury and brain injury conditions, a majority of the participants still supported solitary confinement. In sum, although neuroscience may be able to play a role in shaping public views on solitary confinement, it seems unlikely that neuroscientific evidence will generate large changes in support. If this is true, then it suggests need for additional ways to produce evidence on the effects of solitary confinement. The remainder of the Article explores whether AI can serve this purpose.

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251 See BENJAMIN I. PAGE & ROBERT Y. SHAPIRO, *THE RATIONAL PUBLIC: FIFTY YEARS OF TRENDS IN AMERICANS' POLICY PREFERENCES* 173 (1992); Benjamin I. Page & Robert Y. Shapiro, *Effects of Public Opinion on Policy*, 77 AM. POL. SCI. REV. 175, 185 (1983).



## VI. A ROLE FOR ARTIFICIAL INTELLIGENCE

*Inmates on Level One at the State of Wisconsin's Supermax Correctional Institution in Boscobel, Wisconsin spend all but four hours a week confined to a cell. The "boxcar" style door on the cell is solid except for a shutter and a trap door that opens into the dead space of a vestibule through which a guard may transfer items to the inmate without interacting with him. The cells are illuminated twenty-four hours a day. Inmates receive no outdoor exercise. Their personal possessions are severely restricted: one religious text, one box of legal materials and twenty-five personal letters. They are permitted no clocks, radios, watches, cassette players or televisions. The temperature fluctuates wildly, reaching extremely high and low temperatures depending on the season.*

—Federal District Judge Barbara Crabb, describing solitary confinement in Wisconsin<sup>252</sup>

This Part presents a proposal for an AI system to aid litigants in building a stronger evidentiary record of the effects of solitary confinement.<sup>253</sup> Section VI.A discusses the evidentiary gap. Section VI.B presents the guiding principles for the proposed AI system named Helios. The Three Laws of Helios, modeled on Asimov's Three Laws,<sup>254</sup> guide its operation. Section VI.C presents a vision for how Helios can aid discovery for litigation. The core purpose of Helios is to document, archive, and organize information captured through regular observation of inmate experience. This Part assesses the extent to

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252. Jones 'El v. Berge, 164 F. Supp. 2d 1096, 1098 (W.D. Wis. 2001).

253. To the best of my knowledge, this is a novel proposal. Discussion of AI in prison settings has primarily focused on the possible use of robotic prison guards, Richard Bloss, *Robots Go to Prison—As Guards*, 39 INDUS. ROBOT (2012), and the use of virtual reality to help nonprisoners understand what solitary confinement feels like, Fastco Studios, *Could This Solitary Confinement VR Experience Sway Lawmakers?*, FAST COMPANY (Aug. 31, 2017), <https://www.fastcompany.com/40461046/could-this-solitary-confinement-vr-experience-sway-lawmakers> [<https://perma.cc/9N6S-G6D8>]. A search in Google Scholar and Westlaw produced only the following relevant mentions: Jaana Parviainen et al., *Motions with Emotions?*, in WHAT SOCIAL ROBOTS CAN AND SHOULD DO 210, 214 (Johanna Seibt et al. eds., 2016) ("[S]omeone in solitary confinement might benefit from being given a robot companion—but he or she would benefit far more if offered a friendly social environment."); Peggy Wu et al., *Maintaining Psycho-Social Health on the Way to Mars and Back*, PROC. 2015 VIRTUAL REALITY INT'L CONF. (2015 VRIC), at pt. 2 (discussing the use of socially intelligent Virtual Agents (VAs) as tools to facilitate asynchronous human-human communication and counteract behavioral health challenges associated with prolonged isolation and deep space exploration).

254. ISAAC ASIMOV, *Runaround*, in I, ROBOT 37 (1950).

which technology allows the performance of these features, either now or in the near future.

Perhaps the most important observation to make at the outset is that the value of the AI-based discovery system is relative to the next best human-based alternative. By its nature, solitary confinement offers very limited opportunities for humans to observe and document the experiences of isolated inmates.<sup>255</sup>

The unique conditions of solitary confinement reframe our inquiry. As the epigraph from Judge Crabb makes clear, time spent in supermax solitary confinement is time spent by oneself, “[i]nmates are not allowed face-to-face visits, other than with their lawyers.”<sup>256</sup> What limited discovery exists comes typically in the form of one-off visits from an attorney or expert, and such visits can be carefully orchestrated by the prison staff.<sup>257</sup> Prisons have strong incentives to give outsiders a sanitized, rather than an authentic, view of solitary confinement. Limited to these small snippets of life in solitary confinement, the reality is that most of the potential abuses are not observed by a neutral third party. Thus, our question for AI discovery can be phrased this way: Is the introduction of AI discovery better than the very limited discovery currently allowed?

I emphasize again that the introduction of AI should not be at odds with other efforts to improve inmate access to attorneys, researchers, and medical professionals. Indeed, AI is complementary because it would provide advocates and researchers with richer, more individualized data on the effects of solitary confinement on individual inmates.

### *A. The Evidentiary Gap*

Many commentators have explored why courts have been reluctant to find in favor of litigants challenging the constitutionality of

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255. I do not suggest that AI is the only means by which discovery could be made more robust. Providing inmates with greater access to attorneys, scheduling more regular visits by outside auditors and medical professionals, and allowing inmates to utilize various recording tools would all improve discovery. My point is not to argue that AI is superior to these and other data collection methods, but rather that AI can play a meaningful role alongside these traditional discovery techniques.

256. *Jones 'El*, 164 F. Supp. 2d at 1101.

257. *See id.* This has led reformers in Canada to lobby for “a system of unannounced and unrestricted inspection visits to all places where persons are deprived of their liberty by independent international and national monitoring bodies.” Paul Webster, *Controls Over Solitary Confinement Needed*, 187 CAN. MED. ASS'N J. E3, E3–E4 (2015).

solitary confinement.<sup>258</sup> One of the consistent themes emerging from case law and commentary is that litigants have been much more successful at targeted challenges on behalf of particularly vulnerable groups, such as inmates with mental illness.<sup>259</sup> Broader victories have been difficult to obtain,<sup>260</sup> as “[s]olitary confinement has not only persisted in spite of litigation, it has expanded, with few ameliorations to the harsh conditions that have characterized segregation for decades.”<sup>261</sup>

Professor Keramet Reiter identifies “two mechanisms of this persistence: lack of transparency and deference to prison administrators.”<sup>262</sup> The lack of sufficiently strong evidence is due to this lack of transparency. Research on the effects of solitary confinement is, on the one hand, extensive, but on the other hand, still lacking in the types of systematic study needed to evaluate the effect of an intervention.<sup>263</sup> This paradox is explained by the lack of access that researchers have to the relevant study populations<sup>264</sup> and disagreement about the weight that should be placed on firsthand accounts of prisoners who have spent time in solitary.<sup>265</sup>

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258. See, e.g., Elizabeth Alexander, *“This Experiment, So Fatal”: Some Initial Thoughts on Strategic Choices in the Campaign Against Solitary Confinement*, 5 U.C. IRVINE L. REV. 1, 3–4 (2015); Bennion, *supra* note 110, at 745; Jules Lobel, *Prolonged Solitary Confinement and the Constitution*, 11 U. PA. J. CONST. L. 115, 116–17 (2008); Alexander A. Reinert, *Solitary Troubles*, 93 NOTRE DAME L. REV. 927, 932–34 (2018); Azadeh Shahshahani & Ayah Natasha El-Sergany, *Challenging the Practice of Solitary Confinement in Immigration Detention in Georgia and Beyond*, 16 CUNY L. REV. 243, 260–61 (2013).

259. Alexander, *supra* note 258, at 3 (“To date, essentially all of the litigation successes have come from challenges to the imposition of isolated confinement on behalf of particularly vulnerable groups. For many of these vulnerable groups, the legal theories have resulted in a substantial body of precedents supporting their claims.”).

260. *Id.* (“While this litigation has achieved important results, so far there are no examples of successful litigation attacking isolated confinement across the board.”).

261. Reiter, *supra* note 175, at 1178.

262. *Id.* at 1175.

263. See Graham D. Glancy & Erin L. Murray, *The Psychiatric Aspects of Solitary Confinement*, 1 VICTIMS & OFFENDERS 361, 366 (2006). Many criminal justice programs are not properly evaluated. See Edward J. Latessa, *The Challenge of Change: Correctional Programs and Evidence-Based Practices*, 3 CRIMINOLOGY & PUB. POL’Y 547, 552 (2004); Edward J. Latessa & Alexander Holsinger, *The Importance of Evaluating Correctional Programs: Assessing Outcome and Quality*, 2 CORRECTIONS MGMT. Q. 22, 29 (1998).

264. BRUCE A. ARRIGO, HEATHER Y. BERSOT & BRIAN G. SELLERS, *THE ETHICS OF TOTAL CONFINEMENT: A CRITIQUE OF MADNESS, CITIZENSHIP, AND SOCIAL JUSTICE* 68 (2011) (“[T]he very nature of isolation precludes investigators from gaining meaningful access to those whom they seek to study.”).

265. MICHAEL JACKSON, *PRISONERS OF ISOLATION: SOLITARY CONFINEMENT IN CANADA* 65 (1983).

The research that has been conducted on inmates in solitary has typically involved very small sample sizes.<sup>266</sup> Moreover, it has been noted that a “significant problem is that most such research is based on periods of isolation that are vastly shorter (generally no more than four to ten days) than the periods typically experienced by prisoners placed in actual punitive segregation.”<sup>267</sup> Without access to adequate control groups, this research is also typically unable to determine the causal contribution of the solitary confinement to the harmful outcomes; for instance, would similar outcomes have resulted if the inmate had stayed in the general prison population?<sup>268</sup>

While there are many first person accounts, such experiences cannot capture the broader, class-based experience of solitary confinement. One of the few times that litigants and researchers have to document the conditions of solitary confinement is when a court orders an expert to conduct an evaluation.<sup>269</sup> However, prison staff anticipates these visits, making it likely that evaluators see a more sanitized version of the solitary experience than they would have if they had access to the full twenty-four-hour experience for a period of months. Furthermore, in litigation and in policy debate, prison officials consistently minimize inmate complaints. For instance, in Maryland in 2018 there was a slew of complaints offered in testimony when the legislature considered a reform bill.<sup>270</sup> In response, the Department of Corrections wrote that “[p]lacement in restrictive housing is carefully considered, and when appropriate, is guided by sound security policies along with medical mental health professionals who must balance the need to protect other inmates and staff.”<sup>271</sup> It is not surprising that counterparts in an adversarial process contest each other’s claims. But I emphasize the point because it makes the clear the need for more objective evidence in this space.

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266. See Craig Haney & Mona Lynch, *Regulating Prisons of the Future: A Psychological Analysis of Supermax and Solitary Confinement*, 23 N.Y.U. REV. L. & SOC. CHANGE 477, 516–17, 519, 570 (1997) (reporting sample sizes between four to fifteen inmates for psychiatric clinical studies).

267. *Id.* at 516–17, 519, 521, 570.

268. See Alexandra Naday, Joshua D. Freilich & Jeff Mellow, *The Elusive Data on Supermax Confinement*, 88 PRISON J. 69, 88–89 (2008) (describing what future research should do in order to allow for investigation of the causal relationship).

269. KUPERS, *supra* note 9, at 1, 3.

270. S. 539, 2018 Gen. Assemb., 438th Sess. (Md. 2018).

271. Cameron Dodd, *In Maryland Prisons, Solitary Confinement Is Common and Controversial*, FREDERICK NEWS-POST (July 27, 2018), [https://www.fredericknewspost.com/news/crime\\_and\\_justice/prison/in-maryland-prisons-solitary-confinement-is-common-and-controversial/article\\_9d4adc7c-657a-5319-8918-962fee6c4e4f.html](https://www.fredericknewspost.com/news/crime_and_justice/prison/in-maryland-prisons-solitary-confinement-is-common-and-controversial/article_9d4adc7c-657a-5319-8918-962fee6c4e4f.html) [<https://perma.cc/ZK4X-586G>].

Discovery requests in individual cases can produce a similar resistance from prison officials to cooperate. In a challenge to solitary confinement at California's Pelican Bay Security Housing Unit, lawyers for the plaintiff-inmates experienced significant pushback from prison officials during discovery.<sup>272</sup> After inadequate response to interrogatories and document requests, the plaintiffs sought a motion to compel discovery.<sup>273</sup> Moreover, the plaintiffs sought expert discovery but those experts were denied access to the inmates by the California Department of Corrections.<sup>274</sup> The plaintiffs' lawyers wanted to send in their psychiatrist or psychologist experts to conduct mental health examinations, but the prison officials denied the request.<sup>275</sup> Attorneys had to seek help from the court to gain access.<sup>276</sup> This severely limited access to inmates makes it very challenging to build a case that accurately documents the experience of inmates placed in solitary confinement.

Without more systematic and longitudinal access to the true experience of inmates in solitary confinement, the evidentiary record will be lacking. This leads to the central question of this Article: Can AI help to fill this evidentiary gap?

### *B. Helios: Core Principles*<sup>277</sup>

Since technology may be better received if imbued by a name that captures its purpose, I utilize the name Helios to refer to the proposed AI system. Helios, pictured in Figure 2 below, is a Greek immortal sun god.<sup>278</sup> It is an appropriate name for the AI discovery system because the system would shine a figurative light into the darkness to uncover the true inmate experience of solitary confinement.

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272. Joint Case Management Conference Statement at 9–10, *Ashker v. Brown*, No. C 09-5796 CW, 2013 WL 1701702 (N.D. Cal. Apr. 18, 2013).

273. *Id.* at 10.

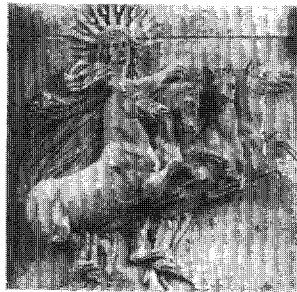
274. *Id.* at 17.

275. *Id.*

276. *Id.*

277. *Helios in His Chariot, Early 4<sup>th</sup> Century BC, Athena's Temple, Illion*, WIKIPEDIA (Dec. 31, 2006), <https://en.wikipedia.org/wiki/Helios#/media/File:Illion---metopa.jpg> [<https://perma.cc/M5D5-C9ZE>] ("Relief showing Helios, sun god in the Greco-Roman mythology. From the North-West pediment of the temple of Athena in Ilion (Troy). Between the first quarter of the 3rd century BC and 390 BC. Marble, 85,8 x 86,3 cm. Found during the excavations lead by Heinrich Schliemann in 1872, now in the Pergamon-Museum in Berlin, Germany.").

278. Gregory Nagy, *Phaethon, Sappho's Phaon, and the White Rock of Leukas*, 77 HARV. STUD. CLASSICAL PHILOLOGY 137, 155–156 (1973).

**Figure 2. Artistic Representation of Helios<sup>279</sup>**

There is another reason to name the technology. Law professor Ryan Calo, a leading thinker on robotics and the law, has argued that robots will require “creating a new category of legal subject, halfway between person and object.”<sup>280</sup> Helios is not *just* an object (like a video camera), but shares certain characteristics with (though is not) a human, and thus would be subject to anthropomorphism by the inmate. The name Helios places this AI in the new legal category that Calo envisions. The implications of this new category emerge in the discussion to follow.

A working definition of Helios is as follows: a self-learning AI system whose mission is to objectively and systematically collect and review information on prisoners’ experiences of solitary confinement. Helios will be a single system engaging with many inmates at once and continually learning from these hundreds or thousands of conversations with inmates in the system. Helios will be capable of communication in multiple voices and languages. Helios will also be connected to the internet and thus connected to relevant stakeholders, such as the inmates’ attorneys and health professionals.

Further explanation is useful to make clear what Helios is and is not. Helios is not what would be referred to as “strong AI” or “general AI.”<sup>281</sup> By definition, “[s]trong artificial intelligence is the creation of machines with the general human capacity for abstract thought and

279. *Helios in His Chariot*, WIKIPEDIA, <https://en.wikipedia.org/wiki/Helios#/media/File:Ilion---metopa.jpg> [https://perma.cc/97TD-U289] (last visited May 11, 2019).

280. Ryan Calo, *Robotics and the Lessons of Cyberlaw*, 103 CAL. L. REV. 513, 549 (2015).

281. Michael Guihot, Anne F. Matthew & Nicolas P. Suzor, *Nudging Robots: Innovative Solutions to Regulate Artificial Intelligence*, 20 VAND. J. ENT. & TECH. L. 385, 395–96 (2017). The distinction between strong and narrow AI is a commonly used distinction in the field, but the distinction is not without its critics. See, e.g., *id.* at 393.

problem solving.”<sup>282</sup> In contrast, “weak” or “narrow” AI—while still a self-learning system—does not approach human level intelligence.<sup>283</sup>

Helios, like IBM’s Watson,<sup>284</sup> is narrow AI. Helios will have a defined set of tasks, as discussed below, but will not approach the general intelligence of science fiction fantasy. Although narrow AI, Helios (again like IBM’s Watson) will use self-learning to improve its algorithms and outcomes over time. Self-learning is at the core of the algorithms that have become a part of daily life, from the Amazon algorithm that predicts what you want to buy<sup>285</sup> to the Pandora algorithm that predicts what you want to listen to next.<sup>286</sup> Both of those algorithms observe human behavior and adjust accordingly.

For instance, Helios will learn how best to communicate with inmates in order for an inmate to feel comfortable sharing evidence of his or her mental life. Helios might also learn the best time to talk to an inmate, the warning signs indicative of mental disorders, and so forth.

A key distinction between a self-learning algorithm and a computer program is that unlike the computer program, the algorithm is regularly being updated. How the algorithm develops depends upon higher-level guidance about what the purposes of the algorithm are.

Isaac Asimov’s “three laws of robotics” are a touchpoint for AI governance. These laws are not meant to be hard coded as lines of code, but rather are meant to provide higher-level guidance to the system as it learns and makes decisions.<sup>287</sup> Asimov’s three laws are:

1. A robot may not injure a human being or, through inaction, allow a human being to come to harm.<sup>288</sup>

282. John O. McGinnis, *Accelerating AI*, 104 NW. U. L. REV. 1253, 1256 (2010).

283. See *id.*

284. Why Watson?, IBM, <https://www.ibm.com/watson/about> [<https://perma.cc/GR5E-7YAH>].

285. Praveen Kopal, *Why Amazon’s Anticipatory Shipping Is Pure Genius*, FORBES (Jan. 28, 2014, 11:34 AM), <https://www.forbes.com/sites/onmarketing/2014/01/28/why-amazons-anticipatory-shipping-is-pure-genius/#7a67f974605e> [<https://perma.cc/R6HZ-7TYL>]; Amit Sharma, *How Predictive AI Will Change Shopping*, HARV. BUS. REV. (Nov. 18, 2016), <https://hbr.org/2016/11/how-predictive-ai-will-change-shopping> [<https://perma.cc/M7N9-FZYU>].

286. Natasha Singer, *Listen to Pandora, and It Listens Back*, N.Y. TIMES (Jan. 4, 2014), <https://www.nytimes.com/2014/01/05/technology/pandora-mines-users-data-to-better-target-ads.html> [<https://perma.cc/FRY7-BLT8>].

287. See MACHINE ETHICS (Michael Anderson & Susan Leigh Anderson eds., 2011); ASIMOV, *supra* note 254, at 37; WENDELL WALLACH & COLIN ALLEN, *MORAL MACHINES: TEACHING ROBOTS RIGHT FROM WRONG* (2008); Roger Clarke, *Asimov’s Laws of Robotics: Implications for Information Technology*, 26 COMPUTER 53, 54 (1993); Robin Murphy & David D. Woods, *Beyond Asimov: The Three Laws of Responsible Robotics*, 24 IEEE INTELLIGENT SYS. 14, 14 (2009).

288. ASIMOV, *supra* note 254, at 37.

2. A robot must obey orders given it by human beings except where such orders would conflict with the First Law.<sup>289</sup>
3. A robot must protect its own existence as long as such protection does not conflict with the First or Second Laws<sup>290</sup>

Using these three laws as the inspiration, Helios should be developed to adhere to the Three Laws of Helios:

1. Helios may not harm a human, or, through inaction, allow a human being to come to harm.
2. Helios must prioritize the interests of the inmate in solitary confinement, except where such prioritization would conflict with the First Law.
3. Helios must follow applicable Codes of Professional Conduct when Helios is performing a function for which a Codes of Professional Conduct would apply for a human performing that same function.

The First Law of Helios tracks Asimov's first law, in that Helios cannot harm either an inmate or any other human. This should be interpreted as a prohibition on Helios providing or storing information that would potentially *lead* to harm.

There are both easy and hard applications of the First Law of Helios. For instance, the following may be interpreted as easy applications:

- If Helios sees a prison guard about to hit an inmate and the prison guard says, "Helios, turn yourself off," Helios should not comply.
- If an inmate speaks repeatedly of wanting to kill himself, Helios has a duty to report that information to appropriate staff.

But here are more difficult applications:

- It is quite likely that an inmate will complain about particular prison guards. Imagine that an inmate says, "Last night Guard Smith refused to serve me dinner for no reason." What should Helios do? On one hand, *if* Helios thought the inmate promoted justice, Helios might report this information to the warden so that Guard Smith could be reprimanded. On the other hand, it is conceivable that the prison system might

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289. *Id.*

290. *Id.*



ignore this information and further punish the inmate for saying this. In that case, Helios should keep the information private. This design consideration is discussed further below.

- The prohibition against inaction could be difficult to implement if Helios does not understand the subtleties of human language. For instance, imagine that an inmate is joking when he says, “Yuck, meatloaf again. I’d rather die than eat this stuff.” Helios should be able to distinguish between legitimately concerning language that merits action, such as notifying a suicide watch team, and a casual joke that merits inaction.

The Second Law of Helios breaks from Asimov’s law in that Helios should be designed to be the *inmate’s* system, not an instrument of the prison. The Second Law says that Helios “must prioritize the *interests of the inmate* in solitary confinement,” except where such prioritization would conflict with the First Law. Helios does *not* need to respond to requests by the prison staff, except to the extent that those requests are governed by the First Law. Tipping the technological scales in favor of the inmate is *foundational* to this proposal.

The criminal justice system, especially supermax prisons, already utilizes significant video monitoring technology. In modern supermax prisons, “all movement is monitored by video surveillance and assisted by electronic door systems. Special alarms, cameras and security devices are everywhere.”<sup>291</sup> Indeed, there is a burgeoning industry of prison surveillance technology companies. One of these companies pitches their technology in this way: “Contraband. Violence. Inmate and officer safety. These are just a few of the issues confronting security professionals working in today’s prisons, jails and other correctional facilities. And video security has never played a more important role in helping maintain order while ensuring a safe working environment.”<sup>292</sup>

The government’s motivation in utilizing surveillance technology is not inmate health, but rather security. Because prisons have their own technology and especially because inmates have zero control over that technology, Helios should be designed to be most sensitive to the needs of solitary confinement inmates.

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291. Jennifer R. Wynn & Alisa Szatrowski, *Hidden Prisons: Twenty-Three-Hour Lockdown Units in New York State Correctional Facilities*, 24 PACE L. REV. 497, 498 (2004).

292. *Corrections: IP Video Security for Prisons, Jails and Correctional Facilities*, PELCO, <https://www.pelco.com/video-security-market/prisons-corrections-correctional-facility-security> [<https://perma.cc/M2X5-HPA5>] (last visited Feb. 17, 2019).

As with the First Law of Helios, the Second Law of Helios invites both easy and hard applications. Easy applications might include the following circumstances:

- Imagine that the inmate shares a number of personal stories with Helios about how much he loves his children. If the inmate then requests that Helios keep these stories private, Helios should not divulge the information to the prison even upon request—unless, of course, the First Law is invoked.
- Imagine that the inmate requests that Helios speaks with him in French rather than in English. Helios should comply with this request.

It should be noted that these are easy in the sense that coding Helios to do these things should not require much in the way of machine moral decision-making. It will not be easy, however, to get approval from the prison to allow Helios to do these things. This, of course, is the whole point of this proposal—solitary confinement is designed to prevent even the most innocent of information exchange and Helios aims to counteract that.

Hard problems for the Second Law of Helios are (1) what it means to “prioritize the interests of the inmate” and (2) identifying when that prioritization violates the First Law.

The following example touches on both problems: Many humans may outwardly express views that run counter to their health. For instance, an addict may tell a friend that everything is fine, even though the friend may see that some sort of intervention is required. Similar situations can readily arise in the solitary confinement context. For instance, Helios may see that the inmate has somehow gained access to illicit, harmful drugs. If the inmate tells Helios not to report that information to anyone, how should Helios respond? How does Helios prioritize the inmate’s interest in such a context?

The Third Law of Helios again breaks from Asimov’s law in that Helios has no law for self-preservation. Instead, Helios is required to abide by relevant Rules of Professional Conduct. For instance, Helios should abide by the same rules as those who would be doing similar discovery throughout the course of their professional services, such as legal advice or psychiatric treatment. The Third Law is meant to recognize that when Helios is taking on a professional role, it must abide by the applicable professional code. The Third Law would be

challenging for Helios in the same ways that it is challenging for human practitioners.<sup>293</sup>

These Three Laws are not perfect, and they are incomplete. They are meant primarily to prompt debate about whether and how such a system could be developed. Development of the Helios system would need to wrestle with a series of further complications that are being addressed by the AI community. These concerns include:

- How best to integrate “machine ethics” into Helios?<sup>294</sup> Helios will be confronted with many ethical dilemmas, and unlike a human whose moral code develops over time in a social context, Helios’s moral code will be reliant upon its initial coding.
- How will Helios prioritize justice and equity?<sup>295</sup> As Ryan Calo has observed, ensuring justice requires consideration of “the prospect of bias in AI-enabled features or products as well as the use of AI in making material decisions regarding financial, health, and even liberty outcomes.”<sup>296</sup>
- Who will govern the development and implementation of Helios? Just as there is an oversight body for other technology introduced into the criminal justice system, so too here some government or private-public entity will need to ensure that Helios is designed, manufactured, and operated in accordance with (not yet defined) standards. Calo, for instance, has proposed a federal robotics commission.<sup>297</sup>

The three proposed rules are not, as stated above, sufficient to address these and other thorny issues. Extensive further discussion is required to work through them. However, the Three Laws form a suitable platform on which to explore how Helios could potentially operate.

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293. For example, the ABA Model Rules of Professional Conduct permit disclosure of a client’s information when it is “reasonably . . . necessary to prevent reasonably certain death or substantial bodily harm.” MODEL RULES OF PROF’L CONDUCT r. 1.6 (AM. BAR ASS’N 2018). It is sometimes difficult for a human attorney to determine whether disclosure is warranted under this exception. It would likely prove difficult for the Helios system as well.

294. LUÍS MONIZ PEREIRA & ARI SAPTAWIJAYA, PROGRAMMING MACHINE ETHICS (2016); Edmund Mokhtarian, *The Bot Legal Code: Developing a Legally Compliant Artificial Intelligence*, 21 VAND. J. ENT. & TECH. L. 145, 171 (2018) (summarizing existing proposals for controlling AI).

295. See Ryan Calo, *Artificial Intelligence Policy: A Primer and Roadmap*, 51 U.C. DAVIS L. REV. 399, 411 (2017).

296. *Id.*

297. RYAN CALO, CTR. FOR TECH. INNOVATION AT BROOKINGS, THE CASE FOR A FEDERAL ROBOTICS COMMISSION 3 (2014), <https://www.brookings.edu/research/the-case-for-a-federal-robotics-commission/> [<https://perma.cc/TZQ8-56CP>].

### *C. A Simple Vision for Helios*

The primary goal of Helios is to systematically collect, store, organize, and analyze information in order to understand the nature and effects of solitary confinement on inmates. But what, exactly, can Helios do that a simple video camera cannot? This Section lays out goals for Helios and evaluates the technological capacity to accomplish each goal either now or in the future.

#### 1. Listen and Observe

Ironically, in an era of Big Data, and in a context in which prisoners' lives are monitored via video almost twenty-four hours per day, 7 days a week, we have little data on what happens to inmates in solitary confinement. In one of the leading cases on unconstitutional prison conditions, Justice Anthony Kennedy observed that “[p]risoners are shut away—out of sight, out of mind.”<sup>298</sup> For those in solitary confinement, access to the outside world is nearly impossible. This practice has made it extremely challenging for researchers to access, as well as litigators to document, what really happens to inmates in solitary confinement.<sup>299</sup> For instance, it is thought that prison guards may regularly use excessive force on inmates in solitary confinement, although such a claim has proven difficult to confirm or discredit.<sup>300</sup> Furthermore, “getting access to prisoners in real life segregation for research purposes raises both practical difficulties and ethical concerns.”<sup>301</sup>

Considering this context, Helios is a way for inmates to share their stories with their attorneys and with the world. To be sure, Helios would remain limited by what inmates chose to share, and recall that Helios could not share anything that the inmate prefers to keep private unless the First Law applied. In order to comply with the Second Law, Helios would be required to keep this information private. Helios could, if the inmate agreed, feed this information into the aggregate data processing system. By analyzing data across multiple inmates, Helios would be able to more readily identify systemic abuses. However, the

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298. *Davis v. Ayala*, 135 S. Ct. 2187, 2209 (2015) (Kennedy, J., concurring).

299. ARRIGO, BERSOT & SELLERS, *supra* note 264, at 68 (“[T]he very nature of isolation precludes investigators from gaining meaningful access to those whom they seek to study.”).

300. KUPERS, *supra* note 9, at 40 (“[W]ith the advent of super-maximum solitary confinement there has been an alarming escalation of force used against prisoners, especially prisoners with serious mental illness.”).

301. SHARON SHALEV, A SOURCEBOOK ON SOLITARY CONFINEMENT 23 (2008), [http://solitaryconfinement.org/uploads/sourcebook\\_web.pdf](http://solitaryconfinement.org/uploads/sourcebook_web.pdf) [<https://perma.cc/R9KU-Y2R9>].

inmate's data would not be included unless the inmate explicitly agreed. The Third Law is important here as well because research on vulnerable populations, such as individuals in solitary confinement, is fraught with ethical difficulty. Thankfully, there are established codes of research ethics that can be used to program and guide Helios.<sup>302</sup>

By collecting and recording information, Helios would be a major advancement in documenting the inmate experience of solitary confinement. If Helios started modestly, with only one hundred inmates each spending just one hundred awake hours a year in solitary (a low estimate), that would provide ten thousand potential hours of data each year.<sup>303</sup> True, the inmates would not be speaking continually for all of those hours, but Helios would likely capture many potential instances of suboptimal care or abuse on video. There would be significant amounts of information on which to train the Helios algorithms. For instance, Helios may be able to anticipate when inmate abuses would occur and could prepare its documentation strategy accordingly.

We do not know what would happen if inmates in solitary confinement suddenly had a responsive voice to speak with, but it seems plausible that many inmates would gladly speak to Helios at length. This information would include descriptions of events, including negative experiences in the prison. But this information could also be used to document the inmates' internal mental states. For those with mental illness, "[i]t is extremely common for prisoners to be ignored, disrespected, terrorized, and treated like animals, but they essentially have no power and no recourse."<sup>304</sup> For once, these inmates would have an ear, albeit electronic, to listen carefully to them and to respond with kindness, not condemnation.

Critics of Helios may ask: Do we have the technology to do listen and observe? The answer unequivocally is, "yes." The field of artificial intelligence has, for many decades, endeavored to create nonhuman

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302. THE NAT'L ACADS., ETHICAL CONSIDERATIONS FOR RESEARCH INVOLVING PRISONERS (Lawrence O. Gostin et al. eds., 2007), [https://www.ncbi.nlm.nih.gov/books/NBK19882/pdf/Bookshelf\\_NBK19882.pdf](https://www.ncbi.nlm.nih.gov/books/NBK19882/pdf/Bookshelf_NBK19882.pdf) [<https://perma.cc/F8L2-TN4W>]; Lawrence O. Gostin, *Biomedical Research Involving Prisoners: Ethical Values and Legal Regulation*, 297 J. AM. MED. ASS'N. 737, 739 (2007).

303. By way of context, to become licensed a clinical psychologist, it is required that—over four to six years—a psychologist in training get 1,500–6,000 supervised clinical hours. Melissa Dittmann, *What You Need to Know to Get Licensed*, AM. PSYCHOL. ASS'N, <https://www.apa.org/gradpsych/2004/01/get-licensed> (last visited Feb. 15, 2019).

304. KUPERS, *supra* note 9, at 57–58.

machines capable of natural conversation with humans.<sup>305</sup> These efforts have been challenging, as “[t]he obstacle for computers is not just understanding the meanings of words, but understanding the endless variability of expression in how those words are collocated in language use to communicate meaning.”<sup>306</sup>

The many limitations notwithstanding, humans have been conversing deeply and emotionally with nonhuman technology for at least a half-century. “Eliza,” a text-based AI system designed to engage in conversation with humans, was introduced in 1966.<sup>307</sup> As discussed by Brian Christian in *The New Yorker*, the computer scientist who created Eliza “was startled to see how quickly and how very deeply people conversing with [the computer] became emotionally involved with the computer and how unequivocally they anthropomorphized it.”<sup>308</sup>

Fifty years later, conversation between humans and nonhumans has become a daily occurrence through the introduction of both voice-based and text-based chatbots.<sup>309</sup> Chatbots are being utilized in settings such as banking,<sup>310</sup> healthcare,<sup>311</sup> education,<sup>312</sup> libraries,<sup>313</sup> and many more. Given how quickly voice-assisted technologies have developed<sup>314</sup> and the financial incentives now in place for companies to

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305. Heung-Yeung Shum, Xiao-dong He & Di Li, *From Eliza to XiaoIce: Challenges and Opportunities with Social Chatbots*, 19 FRONTIERS INFO. TECH. & ELECTRONIC ENG. 10, 10 (2018).

306. Jennifer Hill, W. Randolph Ford & Ingrid G. Farreras, *Real Conversations with Artificial Intelligence: A Comparison Between Human-Human Online Conversations and Human-Chatbot Conversations*, 49 COMPUTERS HUM. BEHAV. 245, 245 (2015).

307. Shum, He & Li, *supra* note 305, at 10.

308. Brian Christian, *The Samantha Test*, NEW YORKER (Dec. 30, 2013), <https://www.newyorker.com/culture/culture-desk/the-samantha-test> [<https://perma.cc/L3F8-FVH9>].

309. RASHID KHAN & ANIK DAS, BUILD BETTER CHATBOTS: A COMPLETE GUIDE TO GETTING STARTED WITH CHATBOTS 2–3 (Todd Green ed., 2018).

310. Songhyun Kim et al., *The Use of Voice Input to Induce Human Communication with Banking Chatbots*, 2018 ACM/IEEE INT’L CONF. ON HUMAN-ROBOT INTERACTION 151.

311. Tobias Kowatsch et al., *Text-Based Healthcare Chatbots Supporting Patient and Health Professional Teams: Preliminary Results of a Randomized Controlled Trial on Childhood Obesity*, PERSUASIVE EMBODIED AGENTS FOR BEHAV. CHANGE WORKSHOP 2017, at pt. 1, [https://www.alexandria.unisg.ch/252944/2/2368\\_Kowatsch%20et%20al%202017%20-%20THCB%20PEACH%20Workshop.pdf](https://www.alexandria.unisg.ch/252944/2/2368_Kowatsch%20et%20al%202017%20-%20THCB%20PEACH%20Workshop.pdf) [<https://perma.cc/4PGL-J6PK>] (summary of findings presented at 2017 Persuasive Embodied Agents for Behavior Change Workshop).

312. Luciana Benotti, María Cecilia Martínez & Fernando Schapachnik, *Engaging High School Students Using Chatbots*, 2014 PROC. CONF. INNOVATION & TECH. COMPUTER SCI. EDUC. 54.

313. MICHELE L. MCNEAL & DAVID NEWYEAR, *Introducing Chatbots in Libraries*, in 49 LIBRARY TECHNOLOGY REPORTS 5, 5 (2013).

314. Ava Mutchler, *Voice Assistant Timeline: A Short History of the Voice Revolution*, VOICEBOT.AI (July 14, 2017, 8:00 AM), <https://www.voicebot.ai/2017/07/14/timeline-voice-assistants-short-history-voice-revolution/> [<https://perma.cc/CU3Y-EP98>].

continue to improve the technology,<sup>315</sup> it seems highly plausible that we already have the necessary technology for Helios to communicate via voice with inmates in solitary confinement. The minimal equipment requirements are as follows: a sufficiently high-quality microphone and speaker; wiring to send the information from the cell to Helios headquarters; and the processing capability at Helios headquarters to store, analyze, and make meaning from the spoken word information. If Siri can understand when asked to find a pair of size 11.5 shoes, surely Helios can keep an organized diary of an inmate's spoken thoughts while in solitary confinement. More challenging is who would actually operate the technology. Because it is installed within the prison system, the prison staff would normally run such a system. But as I discuss below, Helios cannot be co-opted by the government. Thus, rather than prison staff, an independent organization would likely need to administer the technology with an eye toward minimizing the ability of prison staff to interfere with its effective operation.

## 2. Interact

A passive recording system would, by itself, aid litigation by providing litigants with a more complete record. Yet Helios has much greater potential. Aided by developments in AI, Helios should one day be able to socially interact with inmates.

Humans are the most social creatures on the planet.<sup>316</sup> It stands to reason that an inmate is going to provide a richer account of his or her experience in solitary if he or she is interacting socially with the AI, rather than just speaking to a recording device.<sup>317</sup>

To be sure, there is a big leap to true human-like social interaction. Serving as an information repository is a bit of a glorified tape recorder, but richer social interaction is potentially transformative. This is the point at which Helios really distinguishes itself from a simple audio and video recorder. By providing rich social interaction, Helios will dig deep within the social isolation of solitary confinement to develop a full picture of what it means to live within those conditions.

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315. David Kaplan, *Global Smart Speaker Sales Hit 11.7 Million Earlier This Year—But What About Voice Activation Usage?*, GEOMARKETING (Sept. 20, 2018), <https://geomarketing.com/global-smart-speaker-sales-hit-11-7-million-earlier-this-year-but-what-about-voice-activation-usage> [<https://perma.cc/2MG7-D3UJ>].

316. Uta Frith & Chris Frith, *The Social Brain: Allowing Humans to Boldly Go Where No Other Species Has Been*, 365 PHIL. TRANSACTIONS ROYAL SOC'Y 165, 165 (2010).

317. This might also create a concern about inmates providing, either intentionally or unintentionally, inaccurate information to the Helios system.

As Helios becomes more socially engaged with the inmate, it raises additional layers of complexity. For instance, some of the harm of solitary confinement may dissipate if there is more social interaction with Helios. There is also the possibility of a moral hazard: What if an inmate became so engaged by the AI system that the inmate actually wanted to remain in solitary confinement in order to engage with Helios? Is such a perverse incentive possible? If Helios is made available only to those in solitary confinement and if Helios learns to be an excellent companion, perhaps for some inmates Helios will be their best “friend.” Further research and discussion is warranted on this possibility.

Do we have the technology to do this? The requisite technology does not yet exist, but progress is being made. Today, human interaction with robots is no longer limited to simply text and voice.<sup>318</sup> The development of “social robotics” has introduced new types of robots to new types of interactions with humans.<sup>319</sup> Exactly what constitutes a “social robot” depends on context. As one review summarized, “the notion of social robots and the associated degree of robot social intelligence is diverse and depends on the particular research emphasis.”<sup>320</sup>

The use of social robots has been explored to reduce loneliness<sup>321</sup> and to improve outcomes for older adults.<sup>322</sup> One company, Intuition Robotics, is creating a robot named ElliQ specifically for older adults.<sup>323</sup> The company’s CEO describes its goal this way: “Think of [the robot] as a fully autonomous agent . . . . You tell it what your goals are, and it

318. KHAN & DAS, *supra* note 309, at 2–3; David J. Feil-Seifer & Maja J. Matarić, *Human-Robot Interaction*, in 1 ENCYCLOPEDIA OF COMPLEXITY & SYSTEMS SCIENCE 1, 2 (Robert A. Meyers ed., 2009).

319. Terrence Fong, Illah Nourbakhsh & Kerstin Dautenhahn, *A Survey of Socially Interactive Robots*, 42 ROBOTICS & AUTONOMOUS SYSTEMS 143, 145 (2003).

320. Kerstin Dautenhahn, *Socially Intelligent Robots: Dimensions of Human-Robot Interaction*, 362 PHIL. TRANSACTIONS ROYAL SOC’Y 679, 684 (2007).

321. Friederike Eyssel & Natalia Reich, *Loneliness Makes the Heart Grow Fonder (of Robots)—On the Effects of Loneliness on Psychological Anthropomorphism*, 2013 8TH ACM/IEEE INT’L CONF. ON HUM.-ROBOT INTERACTION (HRI) 121, 121–22.

322. Gregory Baltus et al., *Towards Personal Service Robots for the Elderly*, WORKSHOP INTERACTIVE ROBOTS & ENT. pt. 1 (2000); Joost Broekens, Marcel Heerink & Henk Rosendal, *Assistive Social Robots in Elderly Care: A Review*, 8 GERONTECHNOLOGY 94, 98 (2009); Suzanne Hutson et al., *Investigating the Suitability of Social Robots for the Wellbeing of the Elderly*, in 6974 LECTURE NOTES IN COMPUTER SCIENCE 578, 579 (S. D’Mello et al. eds., 2011).

323. Intuition Robotics Team, *The Wait is Over! Become the First to Get an ElliQ*, ELLIQ (Jan. 6, 2019),

<https://elliq.com/blogs/elliq-blog/the-wait-is-over-become-the-first-to-get-an-elliq>  
[<https://perma.cc/DD8N-VZJE>].



tries to measure how you're doing on those goals and suggests activities accordingly to help you meet those goals.”<sup>324</sup>

There are different types of social robots in each context. For instance, some are “service robots.” A service robot is defined by the International Organization for Standardization as a robot “that performs useful tasks for humans or equipment excluding industrial automation applications.”<sup>325</sup> This type of robot requires the “ability to perform intended tasks based on current state and sensing, without human intervention.”<sup>326</sup> In the elder care context, service robots are used to support basic activities such as eating and mobility.<sup>327</sup> Examples of service robots include NurseBot,<sup>328</sup> and Care-O-Bot, which provides service for non-elderly persons as well.<sup>329</sup>

More relevant are “companion robots.” As described by AI researcher Kerstin Dautenhahn:

The companion paradigm emphasizes the assistant role of a robot, i.e. a useful machine, able to recognize and respond to a human's needs, trying to be useful. . . . Important characteristics for such a robot are to be considerate, proactive and non-intrusive, to work towards a relationship of trust and confidentiality with the human, to possess “smooth” communicative skills, to be flexible, willing to learn and adapt, and be competent.<sup>330</sup>

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324. Steven Overly, *In the Future, Virtual Assistants Will Not Only Take Orders. They'll Also Have Ideas of Their Own.*, WASH. POST (May 3, 2017), [https://www.washingtonpost.com/news/innovations/wp/2017/05/03/in-the-future-virtual-assistants-will-not-only-take-orders-theyll-have-ideas-of-their-own/?utm\\_term=.16d6b3a7f112](https://www.washingtonpost.com/news/innovations/wp/2017/05/03/in-the-future-virtual-assistants-will-not-only-take-orders-theyll-have-ideas-of-their-own/?utm_term=.16d6b3a7f112) [https://perma.cc/8T6P-GBBL].

325. *Service Robots*, IFR, <https://www.ifr.org/service-robots> [https://perma.cc/Q5QW-3PHS] (last visited Feb. 16, 2019).

326. *Id.*

327. Broekens, Heerink & Rosendal, *supra* note 322, at 95.

328. NURSEBOT PROJECT: ROBOTIC ASSISTANTS FOR THE ELDERLY, <http://www.cs.cmu.edu/~flo/> [https://perma.cc/5UM5-A3NY] (last visited Feb. 16, 2019).

329. *Care-O-bot 4*, FRAUNHOFER IPA, <https://www.care-o-bot.de/en/care-o-bot-4.html> [https://perma.cc/AG75-L6U8] (last visited Feb. 16, 2019).

330. Dautenhahn, *supra* note 320, at 700.

Examples of companion robots include Paro,<sup>331</sup> The Huggable,<sup>332</sup> and Aibo.<sup>333</sup>

It remains unclear exactly what the effect of these robots will be on outcomes of interest.<sup>334</sup> For instance, a systematic review of social robots in elder care found that the effects have “not been proven comprehensively” and that “relations between the type of outcomes aimed for, either related to support of care or support of independence, and the application of the robot system in care, are not well established.”<sup>335</sup> The same conclusions have been reached in the context of using robots for interactions with autistic children.<sup>336</sup> A systematic review of the literature found fifteen peer-reviewed research studies (with eleven unique samples), but the review also identified a number of methodological limitations.<sup>337</sup> As with the literature evaluating the effects of robots on older adults, the effects of robot interaction on children with autism is in need of “rigorous empirical studies that examine the incremental validity of this approach over other available techniques, as well as the generalizability of skills learned with a robot in relation to those learned from human interaction.”<sup>338</sup>

In these and other areas the message is clear—rapid and expansive developments in social robotics offer great promise. But the precise effects of social robots, remain uncertain at present. Real-world applications of social robotics—along with evaluation of those applications—have been limited. Helios may one day be a companion

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331. *PARO Therapeutic Robot*, PARO, <http://www.parorobots.com/> [<https://perma.cc/6JWL-5TPX>] (last visited Feb. 16, 2019) (“PARO is an advanced interactive robot developed by AIST, a leading Japanese industrial automation pioneer. It allows the documented benefits of animal therapy to be administered to patients in environments such as hospitals and extended care facilities where live animals present treatment or logistical difficulties.”).

332. Sooyeon Jeong, *Huggable: Social Robotic Companion*, PERSONAL ROBOTS GROUP, <http://robotic.media.mit.edu/portfolio/huggable/> [<https://perma.cc/6JWL-5TPX>] (last visited Mar. 8, 2019) (“The Huggable™ is a new type of robotic companion being developed at the MIT Media Lab for healthcare, education, and social communication applications. The Huggable™ designed [sic] to be much more than a fun interactive robotic companion.”).

333. *aibo: Unleash Wonder*, SONY, <https://us.aibo.com/> [<https://perma.cc/L8UC-ZLAT>] (last visited Feb. 16, 2019).

334. Roger Bemelmans et al., *Socially Assistive Robots in Elderly Care: A Systematic Review into Effects and Effectiveness*, 13 J. AM. MED. DIRECTORS ASS'N (JAMA) 114, 120 (2010).

335. *Id.* at 117.

336. Joshua J. Diehl et al., *The Clinical Use of Robots for Individuals with Autism Spectrum Disorders: A Critical Review*, 6 RES. IN AUTISM SPECTRUM DISORDERS 249, 249 (2012); Brian Scassellati, Henny Admoni & Maja Matarić, *Robots for Use in Autism Research*, 14 ANN. REV. BIOMEDICAL ENGINEERING 275, 276, 292 (2012).

337. Diehl et al., *supra* note 336, at 259.

338. *Id.* at 260.

robot, but research to date on other companion robots suggests that we must balance promise with caution.

### 3. Identify Risk of Harm to Self and to Others

It is well established that inmates in solitary confinement are at a higher risk of self-harm, and that they disproportionately experience mental illness.<sup>339</sup> Experts have suggested that, given high rates of suicide ideation and completion relative to the general population, prisons should develop better suicide prevention strategies for those in solitary confinement.<sup>340</sup>

Helios could add value by identifying opportunities for possible earlier interventions to prevent this self-harm. A similar tactic is already being beta-tested by Facebook, as it analyzes users' posts in an effort to spot those who might be especially high risk of taking one's own life.<sup>341</sup> Facebook's Vice President of Product Management simply explained the company's interest in this technology: "[W]e have an opportunity to help here so we're going to invest in that."<sup>342</sup> The same can be said for Helios; if Helios is listening to the inmate and Helios has sufficiently strong evidence to suspect that self-harm is imminent, the First Law requires that Helios act. Helios might also identify risk of harm to others. In both cases, Helios would have to know what the threshold is for alerting a prison authority.

Do we have the technology to do this? Perhaps, but we need to proceed cautiously. In other legal contexts, the potential misuse of algorithms to inform violence risk assessments has drawn considerable attention.<sup>343</sup> For instance, how good will Helios be at predicting self-harm? What data will Helios use to make those predictions? The issues may be particularly challenging in the solitary confinement context

339. Fatos Kaba et al., *Solitary Confinement and Risk of Self-Harm Among Jail Inmates*, 104 AM. J. PUB. HEALTH 442, 444 (2014); Metzner & Fellner, *supra* note 94, at 105.

340. Kaba et al., *supra* note 339, at 444, 447; Seena Fazel et al., *Mental Health Of Prisoners: A Review of Prevalence, Adverse Outcomes, And Interventions*, 3 THE LANCET PSYCHIATRY 871 (2016).

341. Josh Constine, *Facebook Rolls Out AI to Detect Suicidal Posts Before They're Reported*, TECHCRUNCH (Nov. 27, 2017), <https://techcrunch.com/2017/11/27/facebook-ai-suicide-prevention/> [<https://perma.cc/P2ZK-RMUT>].

342. *Id.*

343. Jessica M. Eaglin, *Constructing Recidivism Risk*, 67 EMORY L.J. 59, 62–63 (2017); Melissa Hamilton, *Risk-Needs Assessment: Constitutional and Ethical Challenges*, 52 AM. CRIM. L. REV. 231, 242 (2015); Julia Angwin et al., *Machine Bias*, PROPUBLICA (May 23, 2016), <https://www.propublica.org/article/machine-bias-risk-assessments-in-criminal-sentencing> [<http://perma.cc/FB8E-WSV2>]; Ed Yong, *A Popular Algorithm Is No Better at Predicting Crimes Than Random People*, ATLANTIC (Jan. 17, 2018), <https://www.theatlantic.com/technology/archive/2018/01/equivant-compas-algorithm/550646/> [<https://perma.cc/4JNT-3X64>].

because being put on “suicide watch” can involve even more deprivation.<sup>344</sup>

These potential pitfalls also raise the question of liability. Liability for AI systems is being debated in legal scholarship.<sup>345</sup> Here, potential plaintiffs include the inmates (if Helios misunderstands or misrepresents their interests); the prison officials (if Helios makes errors in alleging prison abuses); and others such as some subgroup of inmates if they see that Helios is biased against their interests. As with other areas of AI liability, who would be responsible for a problem in Helios’s self-learning? The manufacturer? The prison installation team? The programmers? These are questions that would have to be addressed prior to Helios implementation.

## VII. DISCUSSION

The proposal advanced in Part VI raises an interrelated set of difficult ethical and legal questions concerning the design and implementation of Helios. This Part groups these questions broadly into “design” questions in Section VII.A and “legal and ethical” questions in Section VII.B. The two categories are related of course, because whether or not society should pursue Helios depends, in large part, on what sorts of protections can be built into the code. Section VII.C closes with some broader reflections on what Helios might become, and what the most practical next steps might be.

### A. Design Considerations

Over and above the many issues already implicated in the discussion above, this Section considers further design considerations. First, it discusses the most important consideration—privacy. Second, it addresses a series of design choices.

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344. Robert J. Cramer et al., *Suicide Prevention in Correctional Settings: Current Standards and Recommendations for Research, Prevention, and Training*, 23 J. CORRECTIONAL HEALTH CARE 313, 317, 319 (2017).

345. Weston Kowert, *The Foreseeability of Human-Artificial Intelligence Interactions*, 96 TEX. L. REV. 181, 204 (2017); Matthew U. Scherer, *Regulating Artificial Intelligence Systems: Risks, Challenges, Competencies, and Strategies*, 29 HARV. J.L. & TECH. 353, 366 (2016); Jin Yoshikawa, Note, *Sharing the Costs of Artificial Intelligence: Universal No-Fault Social Insurance for Personal Injuries*, 21 VAND. J. ENT. & TECH. L. 1400, 1400 (2019) (proposing a social liability scheme that covers all AI injuries).

## 1. The Dark Side of Surveillance: Can Helios Really Protect Inmate Privacy?

The level of surveillance and control already at the heart of the modern US prison system has been heavily critiqued.<sup>346</sup> Parallels to Michael Foucault's panopticon are myriad.<sup>347</sup> Amidst this system, a central concern with Helios is that it would give to the state another—and an even more intimate—layer of surveillance, control, and domination.

Is it not an invasion of privacy—indeed, perhaps the deepest violation of privacy—to introduce Helios into this system?<sup>348</sup> Would Helios serve in practice to assist the government and not the inmate? With no one else to talk to, if an inmate begins speaking freely with the AI system, would his or her words not be used against him or her by the prison? Moreover, could the state not design the system such that it would be calibrated to promote the state's interests in control, rather than an interest in the individual inmate's well-being?

The response to these and other related questions is, of course: Yes, the technology could be co-opted by the state. Instead of providing consolation, the technology could promote control; instead of robot rehabilitation, it could usher in a world of robot retributivism.

In theory, these dangers can be avoided *if* Helios adheres to the First Law of Helios: Helios may not harm a human or, through inaction, allow a human being to come to harm. Helios could be programmed to understand "harm" to include violations of privacy.

But this is a big "if." Theory may not match reality. Imagine this scenario: A prison agrees to install Helios, but later reprograms it with a new rule that overrides the Three Laws and says, "Whenever an inmate in solitary admits a past rules infraction, Helios must immediately report this infraction to the warden." The prison might go a step further and add another rule: Helios must report to the prison anything that is said by the inmate that may possibly be relevant to

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346. Lorna A. Rhodes, *Supermax as a Technology of Punishment*, 74 SOC. RES. 547, 553, 560 (2007).

347. David Lyon, *The Search for Surveillance Theories*, in THEORIZING SURVEILLANCE: THE PANOPTICON AND BEYOND 3, 3–4 (David Lyon ed., 2006).

348. The US Supreme Court, for instance, has consistently restrained law enforcement from listening to conversations in our homes without a warrant. *Welsh v. Wisconsin*, 466 U.S. 740, 748 (1984) ("It is axiomatic that the 'physical entry of the home is the chief evil against which the wording of the Fourth Amendment is directed.' And a principal protection against unnecessary intrusions into private dwellings is the warrant requirement imposed by the Fourth Amendment on agents of the government who seek to enter the home for purposes of search or arrest." (citations omitted)).

assessing the inmate's mental health or likelihood of violent behavior. Phrased in this way, almost anything the inmate says would end up in the hands of the warden. And Helios would learn—by seeing what happens after sharing this information—that the results are not good for the inmate.

If Helios were co-opted at this design stage, or if Helios were vulnerable to government hacks, it would rapidly become the most insidious of government tools—the illusion of companionship but, in reality, a government spy. As such, it would fit right in with modern prison systems; these systems currently “represent the application of sophisticated, modern technology dedicated entirely to the task of social control, and they isolate, regulate, and surveil more effectively than anything that has preceded them.”<sup>349</sup>

This outcome must be avoided at all costs and if Helios cannot be designed to protect the inmate's privacy, then it should not be introduced into the prison system. These privacy concerns appear throughout the emerging law and AI literature<sup>350</sup> and that literature can be leveraged to inform the design of Helios.

## 2. Many Design Choices

If designers can develop Helios in such a way that protects inmate safety, the next step is to consider design choices. Helios invites creative consideration of many design choices, including:

*Voice and language.* Helios would be the single system capable of a large number of voices—male, female, loud, soft, etc.—and a large number of languages and dialects. How would Helios choose a tone, voice, or language for each inmate? How much input would an inmate have? For instance, could an inmate request a female rather than a male voice? Could an inmate request a particular accent?

*Multiple voices at once.* The proposal thus far has imagined a single-voice speaking to an inmate. But Helios could provide the inmate with multiple AI voices at the same time. For instance, perhaps an inmate would like to be part of a group conversation: Helios could easily provide the rest of the group. This dialogue approach might have

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349. Craig Haney, “*Infamous Punishment*”: *The Psychological Consequences of Isolation*, 8 NAT'L PRISON PROJECT J. 3, 3 (1993).

350. Calo, *supra* note 295, at 420; Calo, *supra* note 280, at 547 (“Robotics is shaping up to be the next transformative technology of our time.”); Cary Coglianese & David Lehr, *Regulating by Robot: Administrative Decision Making in the Machine-Learning Era*, 105 GEO. L.J. 1147, 1151 (2017).

therapeutic benefits, as there is evidence about the positive effects of group therapy in many contexts.<sup>351</sup>

*Connecting inmates across the country.* Helios will be self-learning based on thousands of conversations with inmates in solitary confinement. If an inmate gave permission, could Helios then integrate conversations across inmates, in order to build community and solidarity? This would be a high tech version of “passing notes” between the bars of prison cells. It might aid the construction of a class of inmates for purposes of constitutional challenges.

*Fair, accountable, and transparent.* How, exactly, will Helios process its massive amounts of information? More attention needs to be paid to the details. There has been much discussion of how to make AI systems fair, accountable, and transparent.<sup>352</sup> The now annual conference of the Fairness, Accountability, and Transparency in Machine Learning (FAT/ML) organization tackles questions such as how one codes “fairness.”<sup>353</sup> Any development of Helios would necessarily require these types of considerations.

*Programming for individuals and groups.* How would coding take account of the multitude of differences across inmates in solitary confinement? For instance, would Helios run different code for inmates below age thirty, as opposed to those over age fifty? Would such code take into account mental disorders? Race? Religion? Gang affiliation? And how much information would Helios gather on its own to inform such decisions?

*AI helping prison guards.* Professor Craig Haney has argued that an “ecology of cruelty” develops in supermax prisons as prison guards become engulfed in the toxicity of punitiveness.<sup>354</sup> Could AI help to reach these guards and remind them of their common humanity with the prisoners they control?

*International applications.* The analysis could, and should, be extended to contexts beyond the United States and beyond prisons. For

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351. See, e.g., Isabel A. Yoon et al., *Outcomes of Psychological Therapies for Prisoners with Mental Health Problems: A Systematic Review and Meta-Analysis*, 85 J. CONSULTING & CLINICAL PSYCHOL. 783, 787 (2017).

352. See, e.g., Calo, *supra* note 295, at 411 (“Perhaps the most visible and developed area of AI policy to date involves the capacity of algorithms or trained systems to reflect human values such as fairness, accountability, and transparency.”).

353. See FAT/ML, <http://www.fatml.org> [<https://perma.cc/FVZ3-LXFF>] (last visited Jan. 30, 2019).

354. See Haney, *supra* note 85, at 958; Leena Kurki & Norval Morris, *The Purposes, Practices, and Problems of Supermax Prisons*, 28 CRIME & JUST. 385, 395 (2001) (noting that inmates can be subject to conditions in their cells allowing for constant surveillance, such as a light being kept on at all times).

instance, could the same (or modified) technology be deployed in situations where enemy combatants are indefinitely detained? How and where would international human rights standards apply?

### 3. Infrastructural and Architectural Considerations

Beyond the scope of this Article is the precise blueprint for how Helios would be installed into a prison system. But, without minimizing the extensive work required, it is worth noting that supermax prisons are already wired for 24/7 surveillance.<sup>355</sup> Helios could be built on top of the existing high tech setup already in place.

### 4. Confinement Companion Technology for the Hearing- and Speech-Impaired

The proposal thus far has assumed that the inmate in solitary confinement does not have a hearing or speech impairment, but the reality is that some inmates do have these impairments.<sup>356</sup> It is likely that prison generally, and solitary confinement in particular,<sup>357</sup> may be especially difficult for those with physical disabilities.<sup>358</sup> Given these concerns, it would be important to consider alternative designs for Helios that might allow these populations to share in its benefits.

## B. Legal and Ethical Considerations

### 1. Protecting Privacy with Privilege?

A technical solution could help Helios ensure the privacy of inmate conversations. But it may be more likely that a legal solution—*privilege*—will be most effective. For more than four centuries, English and now US courts have collectively recognized an attorney-client

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355. See Kurki & Morris, *supra* note 354, at 390.

356. See, e.g., Laura Margaret Kelly, *Sounding Out d/Deafness: The Experiences of d/Deaf Prisoners*, 8 J. CRIM. PSYCHOL. 20, 28 (2018).

357. See Farina Mendelson, *A Silent Struggle: Constitutional Violations Against the Hearing Impaired in New York State Prisons*, 20 CUNY L. REV. 559, 584 (2017).

358. See JAMELIA N. MORGAN, ACLU, CAGED IN: SOLITARY CONFINEMENT'S DEVASTATING HARM ON PRISONERS WITH PHYSICAL DISABILITIES 4 (2017), [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2952112](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2952112) [<https://perma.cc/6NHA-VTNM>]; Margo Schlanger, *Prisoners with Disabilities: Individualization and Integration* 17 (Acad. for Justice, Working Paper No. 544, 2017), [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2932940](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2932940).



privilege.<sup>359</sup> For roughly two hundred years, courts have recognized some form of physician-patient privilege.<sup>360</sup> And courts too have recognized a limited privilege between a priest and a confessor.<sup>361</sup>

In order for conversations with Helios to be privileged, it would require a reconsideration of the relationship between attorney, client, and Helios. For instance, is Helios an agent of the attorney? If so, would this require a new type of category for a nonhuman agent? Should Helios instead be analogized to something like a communication device of the attorney, for example in the same way an email program facilitates communication.

Certainly, some revisiting of doctrine will be required if non-human robots are introduced into the loop. Legal scholar Ryan Calo has very usefully pointed out the “difficulty of placing robots in one category or another, and our tendency in general to behave around social technology as though it were a person.”<sup>362</sup> Helios is not a person, yet Helios, as envisioned, is also not simply a tape recorder. Rather, Helios is something in between. Might we be able to justify a privilege for this in-between category?

## 2. Should This Technology Be Developed for *All* Inmates?

This Article has argued for the development of an AI discovery system for inmates in solitary confinement. But why not make the technology more widely available to the full prison population? After all, there are high rates of mental illness in the overall incarcerated population.<sup>363</sup> Moreover, mental health services provided by prisons are inadequate, with some researchers estimating that prisons only have the capability to treat between 10 percent and 12 percent of the prison population.<sup>364</sup>

With so many prisoners in need of attention to their mental health, what is the justification for focusing only on those in solitary

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359. See Christopher T. Hines, *Returning to First Principles of Privilege Law: Focusing on the Facts in Internal Corporate Investigations*, 60 KAN. L. REV. 33, 41 (2011) (“[T]he antecedents of the attorney-client privilege stretch for more than 400 years of Anglo-American legal history.”).

360. See Daniel W. Shuman, *The Origins of the Physician-Patient Privilege and Professional Secret*, 39 SW. L.J. 661, 671–72 (1985).

361. Jacob M. Yellin, *The History and Current Status of the Clergy-Penitent Privilege*, 23 SANTA CLARA L. REV. 95, 127 (1983).

362. Calo, *supra* note 280, at 547.

363. See, e.g., DORIS J. JAMES & LAUREN E. GLAZE, U.S. DEPT OF JUSTICE, MENTAL HEALTH PROBLEMS OF PRISON AND JAIL INMATES 1 (2006); Henry J. Steadman et al., *Prevalence of Serious Mental Illness Among Jail Inmates*, 60 PSYCHIATRIC SERVS. 761, 761 (2009).

364. See Terry A. Kupers, *What to Do with the Survivors? Coping with the Long-Term Effects of Isolated Confinement*, 35 CRIM. JUST. & BEHAV. 1005, 1008 (2008).

confinement? The answer is two-fold. The practical response is that reform must start somewhere and it makes sense to start where the conditions are most deplorable. The substantive response is that in those other contexts, human contact is available in ways that it is not for those in solitary confinement. If successful in the solitary confinement context, Helios could be expanded for use in the general prison population as well.

### 3. The New “Eye of God?”

A feature of early solitary confinement in the United States was an opening at the top of the prison cell called the “Eye of God,” which is depicted in Figure 3 below.<sup>365</sup> This daylight opening was intended to allow the inmate to communicate with God in order to reform his or her soul—and consequently his or her behavior.<sup>366</sup> Promoted by the Quakers in Pennsylvania in 1790, a law was passed to encourage “unremitted solitude” and “prevent all external communication.”<sup>367</sup> This Philadelphia system drew much attention when it was piloted in the Eastern State Penitentiary in 1821.<sup>368</sup>

When George Smith wrote his 1833 defense of solitary confinement for the state of Pennsylvania, he opened his essay by recognizing that “[t]he prevention of crimes and the reformation of criminals in lieu of the vindictive infliction of pain on offenders, are now almost universally acknowledged to be the only legitimate designs which can justify the infliction of human punishment.”<sup>369</sup> At Eastern State Penitentiary, the Quakers aimed for this design to be “monastic” and an “atmosphere of silence, solitude, meditation, and complete isolation” was carefully considered during the construction of the prison, which was considered to be “technologically far ahead of its time.”<sup>370</sup>

Designed by architect John Haviland, the exterior of the Penitentiary exhibited a gothic style whose purpose was to frighten and “dissuade free citizen from committing crime.”<sup>371</sup> In contrast, the cells themselves were bare of any furniture or decoration, with the exception

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365. See Schmid, *supra* note 12, at 553.

366. See *id.* at 554.

367. FRIEDMAN, *supra* note 12, at 78.

368. See *id.* at 79.

369. GEORGE WASHINGTON SMITH, A DEFENSE OF THE SYSTEM OF SOLITARY CONFINEMENT OF PRISONERS ADOPTED BY THE STATE OF PENNSYLVANIA 1 (1829).

370. See Schmid, *supra* note 12, at 550.

371. *Id.* at 552.

of a single skylight at the top of the cell coined “the eye of God.”<sup>372</sup> This architectural feature served two purposes: to provide natural light to the cell and “as a reminder to prisoners that the eye of God is watching them,” which highlighted the Quaker belief that “[t]otal solitude before God was supposed to effect a conversion of the criminal’s moral sensibilities.”<sup>373</sup> This feature was also supposed to promote a sense of “totalizing surveillance” in the prisoners, from both within the cell through the “eye of God” and outside the cell from the prison guards.<sup>374</sup>

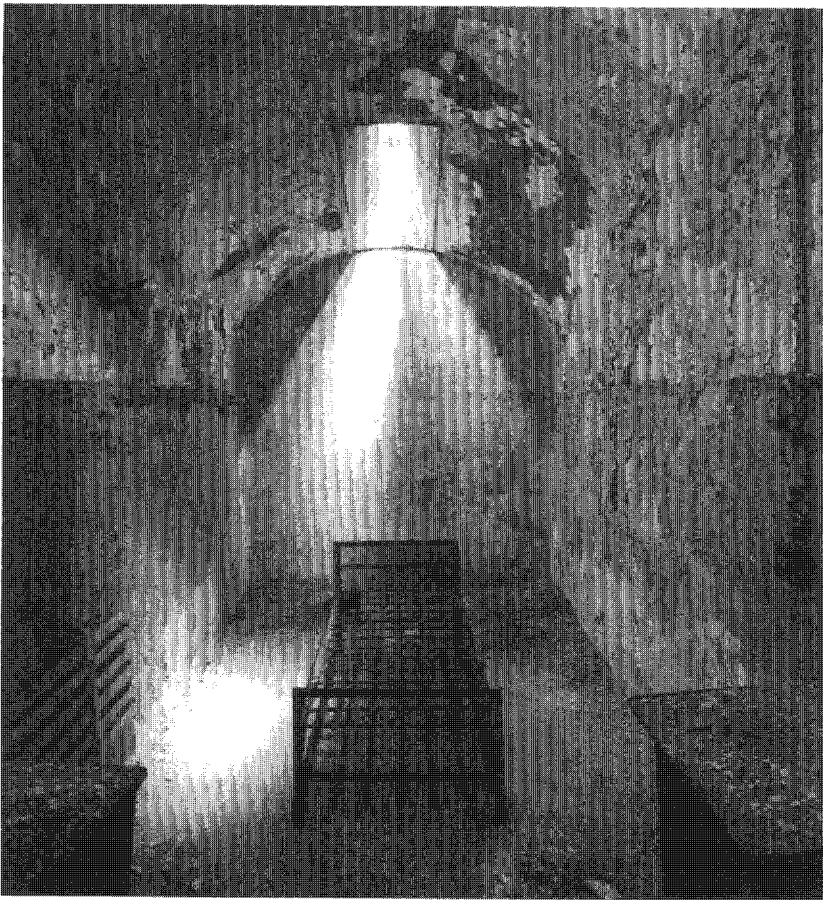
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372. *Id.* at 553.

373. *See id.* at 553–54.

374. *See* Jill A. McCorkel, *Embodied Surveillance and the Gendering of Punishment*, 32 J. CONTEMP. ETHNOGRAPHY 41, 60 (2003).

Figure 3. Eastern State Penitentiary's "Eye of God" Cell<sup>375</sup>



The "eye of God" feature also reflected the Protestant belief that an "individual encounter" between the criminal and God was necessary in order for the prisoner to be rehabilitated,<sup>376</sup> and that solitary confinement should aim to promote such an encounter.<sup>377</sup> It was the "therapeutic environment" of the penitentiary that separated it from other prisons, which emphasized punishment.<sup>378</sup> Later on, the Bible would be the first book to be provided to these inmates, who were

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375. Trevor.patt, Flickr, <https://www.flickr.com/photos/trevorpatt/13982305072> (last visited May 3, 2019).

376. See Schmid, *supra* note 12, at 554.

377. See *id.* at 553.

378. See McCorkel, *supra* note 374, at 60.

encouraged, under the “eye of God,” to “read the Scriptures and find their own salvation.”<sup>379</sup>

This background on the eye of God sets up an interesting parallel: Would Helios be the new eye of God? In a culture that is (slowly) moving away from organized religion, and at least moving toward the worshipping of technology, could Helios take on some sort of deity role? And if so, would *religious* free exercise protections then be applicable?

It is well established that “religious practices of prisoners, as distinguished from their beliefs, may properly be the subject of administrative regulation and control, so long as particular religious groups are not improperly discriminated against and so long as the action taken by the prison authorities is not arbitrary or unreasonable.”<sup>380</sup> How would this apply to Helios if, as speculated, the inmate’s relationship to Helios took on a more religious dimension?

#### 4. Could Helios Independently Provide Professional Services Such as Psychiatric Treatment and Legal Counsel?

Solitary confinement may be particularly harmful for those with mental illness, a topic that has been subject of class action litigation.<sup>381</sup> Inmates in solitary confinement often lack adequate mental health treatment and do not enjoy regular visits with their attorneys.<sup>382</sup> Thus, the possibility of Helios as an independent AI attorney and AI psychiatrist is tantalizing. Consider first the value added by Helios for an inmate’s mental health. It has been observed repeatedly by experts that inmates facing severe mental disorders are not receiving adequate

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379. This design was also meant to instill “the metaphor of the cell as a grave,” in which criminals were viewed as “sinners who had fallen away from God and who needed to have their lives reconciled to God.” Schmid, *supra* note 12, at 554–55. It was this aspect of confinement that would later cause Charles Dickens to testify against solitary confinement at the Eastern State Penitentiary, describing the prison as a “parade of ghostly figures” and inmates who looked as if they had been “summoned from the grave.” Using these terms, Dickens implied that “the prisoner, in this system, is somehow dead: ‘He is a man buried alive.’” *Id.* at 555; see also Caleb Smith, *Detention Without Subjects: Prisons and the Poetics of Living Death*, 50 TEX. STUD. LITERATURE & LANGUAGE 243, 254–55, 258 (2008).

380. See W. E. Shipley, Annotation, *Provision of Religious Facilities for Prisoners*, 12 A.L.R. 3d 1276 Art. 2 (1967); Williams v. King, 56 F. Supp. 3d 308, 329 (S.D.N.Y. 2014) (“[P]rison officials may not substantially burden an inmate’s religious practice, or selectively discriminate against an inmate based on religion, without legitimate penological justification.”).

381. See, e.g., Coleman v. Wilson, 912 F. Supp. 1282, 1321 (E.D. Cal. 1995).

382. See, e.g., Lobel, *supra* note 258, at 133; Tom Haydon, *Solitary Confinement Limited Inmate’s Access to Legal Advice, Lawyer Says*, NJ.COM (Aug. 12, 2014), [http://www.nj.com/union/index.ssf/2014/08/solitary\\_confinement\\_limited\\_inmates\\_access\\_to\\_legal\\_advise\\_lawyer\\_say.html](http://www.nj.com/union/index.ssf/2014/08/solitary_confinement_limited_inmates_access_to_legal_advise_lawyer_say.html) [https://perma.cc/W2M6-PVDY].

treatment.<sup>383</sup> Helios could provide prison-specific treatment interventions that are empirically supported.<sup>384</sup>

Looking instead at the need for legal counsel, inmates—including those in solitary confinement—have a constitutional right to speak with their attorney; however, in practice, this access can be curtailed.<sup>385</sup> The ability of Helios to provide regular, responsive, and extensive legal advice would be a major advance.

Moreover, if Helios could take on either of these professional roles, Helios might more readily enjoy the privileged conversations as discussed above. Although the Second Law of Helios requires Helios to respect the inmate's requests to keep information private, the Second Law is a coding principle and would not provide the same sort of legal protections as privilege. If Helios developed the capability to take on these rules, extensive analysis would be required to determine where privilege would apply amidst the inmate-Helios conversations.

We do not yet have the technology to provide full legal counsel and psychiatric treatment, but efforts are underway. For decades, researchers have examined the possibility of AI semantic information processing for legal applications.<sup>386</sup> Yet, to date the major contributions have been in automatic tasks such as electronic discovery and

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383. See, e.g., Andrew P. Wilper et al., *The Health and Health Care of US Prisoners: Results of a Nationwide Survey*, 99 AM. J. PUB. HEALTH 666, 671 (2009).

384. This may take some time to develop, as research in this area lags. See TORREY ET AL., *supra* note 87, at 8, 12.

385. See, e.g., Haydon, *supra* note 382.

386. See, e.g., ANNE VON DER LIETH GARDNER, AN ARTIFICIAL INTELLIGENCE APPROACH TO LEGAL REASONING 1 (L. Thorne McCarty & Edwina L. Rissland eds., 1987); Vincent Aleven, *Using Background Knowledge in Case-Based Legal Reasoning: A Computational Model and an Intelligent Learning Environment*, 150 ARTIFICIAL INTELLIGENCE 183, 184 (2003); Kevin D. Ashley & Stefanie Brüninghaus, *Computer Models for Legal Prediction*, 46 JURIMETRICS J. 309, 309 (2006); Kevin D. Ashley, *Reasoning with Cases and Hypotheticals in HYPO*, 34 INT'L J. MAN-MACHINE STUD. 753, 793 (1991); Bruce G. Buchanan & Thomas E. Headrick, *Some Speculation About Artificial Intelligence and Legal Reasoning*, 23 STAN. L. REV. 40, 40 (1970); Edwina L. Rissland, *Artificial Intelligence and Law: Stepping Stones to a Model of Legal Reasoning*, 99 YALE L.J. 1957, 1957–58 (1990).

standardized forms.<sup>387</sup> It does not seem likely that robots will fully replace most attorneys any time soon.<sup>388</sup>

The use of AI in psychiatry is similarly at a very early stage. A review of recent developments stressed that although it is too early to tell, the advancement of AI technologies may enhance mental health care and increase efficiency.<sup>389</sup> But it is unclear whether robots can do this alone, without a human in the loop.<sup>390</sup> Still, there are a handful of exploratory studies that offer promise. In a proof-of-principle study, Gillinder Bedi and colleagues sought to combine automated speech analyses with Machine Learning to predict later psychosis onset in youths at clinical high-risk (CHR).<sup>391</sup> These speech features predicted later psychosis development with 100 percent accuracy, outperforming classification from clinical interviews.<sup>392</sup> These findings support the utility of automated speech analysis to measure subtle, clinically relevant mental state changes in emergent psychosis. But these findings are just the beginning. Most of the studies to date have explored human *plus robot* (or “robot-assisted”) treatment approaches. A 2014 meta-analysis found that more studies are needed to prove the efficacy of robot-enhanced therapy, but the overall results clearly support the use of robot-enhanced therapy for different populations.<sup>393</sup>

At present, it is unclear when—or if—AI will develop to the point that it could competently provide professional legal or counseling services without a human in the loop. But if that were possible,

387. See, e.g., Kathryn D. Betts & Kyle R. Jaep, *The Dawn of Fully Automated Contract Drafting: Machine Learning Breathes New Life into a Decades-Old Promise*, 15 DUKE L. & TECH. REV. 216, 227 (2017); Coglianese & Lehr, *supra* note 350, at 1176; John O. McGinnis & Russell G. Pearce, *The Great Disruption: How Machine Intelligence Will Transform the Role of Lawyers in the Delivery of Legal Services*, 82 FORDHAM L. REV. 3041, 3041 (2014); Josh Blackman, *Robot, Esq.* 2 (Jan. 9, 2013), <https://ssrn.com/abstract=2198672> [<https://perma.cc/C7L2-NVCE>] (unpublished manuscript); Julie Sobowale, *How Artificial Intelligence Is Transforming the Legal Profession*, ABA J. (Apr. 2016), [http://www.abajournal.com/magazine/article/how\\_artificial\\_intelligence\\_is\\_transforming\\_the\\_legal\\_profession](http://www.abajournal.com/magazine/article/how_artificial_intelligence_is_transforming_the_legal_profession) [<https://perma.cc/9W7C-BC3P>].

388. See, e.g., Steve Lohr, *A.I. Is Doing Legal Work. But It Won't Replace Lawyers, Yet.*, N.Y. TIMES (Mar. 19, 2017), <https://www.nytimes.com/2017/03/19/technology/lawyers-artificial-intelligence.html> [<https://perma.cc/36L9-LWWU>].

389. See David D. Luxton, *Artificial Intelligence in Psychological Practice: Current and Future Applications and Implications*, 45 PROF. PSYCHOL. 332, 335 (2014).

390. See *id.* at 336.

391. Gillinder Bedi et al., *Automated Analysis of Free Speech Predicts Psychosis Onset in High-Risk Youths*, 1 NATURE PARTNER J.: SCHIZOPHRENIA 15030, at 1–2 (2015), <https://www.nature.com/articles/npjzsch201530.pdf> [<https://perma.cc/KR2L-ZFEW>].

392. See *id.* at 1.

393. See Cristina A. Costescu, Bram Vanderborght & Daniel O. David, *The Effects of Robot-Enhanced Psychotherapy: A Meta-Analysis*, 18 REV. GEN. PSYCHOL. 127, 127 (2014).

applying such technology to solitary confinement would be of great service.

### *C. Practical Considerations*

#### 1. How Will Helios Be Funded?

Developing Helios will not be cheap. Moreover, in order to attract investors, there must be a viable path to market adoption. What prison is going to adopt a technology that seems to subvert its rationales? The most likely answer is a prison that is forced to adopt Helios by a court or a legislature. In this way, a court order or similar legislation could kick-start a market. Helios could find its *entre* into the justice system through a settlement, a court order, or legislation.

There is precedent for something similar. In New York City, a settlement related to excessive force by prison guards included a requirement that the prison install “hundreds of new wall-mounted video cameras with recording capability—in addition to the 2,000 cameras already in place,” with the thought that this would better document—and thus reduce—violence by guards on inmates.<sup>394</sup> The rationale for the monitoring was described by US Department of Justice Inspector General Glenn Fine: “With video surveillance you often can see what happened before or after an incident, so that’s very important, and we have relied upon that kind of evidence very strongly.”<sup>395</sup>

These visual and auditory records protect prisoners and staff from violence and from false allegations of misconduct. According to Leslie Walker, Executive Director of Massachusetts Correctional Legal Services, cameras can curb the “tiny, degrading, everyday humiliating name calling that can occur.”<sup>396</sup> Walker said that this type of conduct “will not be reported with any regularity or believed unless it is *seen and heard*.”<sup>397</sup> The same logic applies to the confinement companion; Helios can hear those whose voices have been ignored.

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394. See John J. Gibbons & Nicholas de B. Katzenbach, *Confronting Confinement: A Report of the Commission on Safety and Abuse in America’s Prisons*, 22 WASH. U. J.L. & POL’Y 385, 434–35 (2006).

395. *Id.* at 434.

396. *Id.* at 434–35.

397. *Id.* (emphasis added).



## 2. Next Steps: Where to Start?

This is the first proposal for utilizing AI in the context of solitary confinement. Like most beta proposals, it is in need of much further scrutiny and revision. But what are the next steps after that? Most promising is the advent of a public-private partnership to develop a proof-of-concept Helios system. Experimental work with non-incarcerated subjects could serve as proof-of-concept, and a business plan could be developed to attract investors.

Equally critical will be buy-in from the judiciary, legislatures, and state and federal governments. As Calo has pointed out, “[t]he government possesses a wide variety of means by which to channel AI in the public good.”<sup>398</sup> In particular, “policymakers at all levels ought to be thinking about the qualities and characteristics of the AI-enabled products government will purchase and the companies that create them.”<sup>399</sup> Public pressure at the state level could force a prison system to adopt Helios, at least on a trial basis. Government and private funding would be required to conduct the rigorous testing needed to prove both proof-of-concept and efficacy.

## VIII. CONCLUSION

This Article has argued that both neuroscience and AI might aid litigants and advocates who are challenging solitary confinement. Although limited in its present ability to show the effects of solitary confinement on the brains of inmates, neuroscience is nevertheless being utilized in legal cases and policy debates.

Artificial intelligence might also be developed to generate new evidence on the effects of solitary confinement. The Article has laid out a vision for Helios, a self-learning AI system that can collect, organize, and analyze information from inmates in solitary confinement.

It will not be easy to make a dent in the ugly, punitive, soul-crushing system of supermax prisons. But it is possible. It was not so long ago that the self-driving car was a science fiction fantasy; today, cities are preparing for a future without human drivers.<sup>400</sup> If it is possible to put ten million self-driving cars on the road by 2020, is it not also possible to develop an AI system to aid inmates in solitary confinement?

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398. Calo, *supra* note 295, at 429.

399. *Id.*

400. *See id.* at 417.

The vision developed here for Helios emphasizes that the inmate's interests must be the utmost priority and that the system must not be co-opted by the government. With this sensitivity to inmate privacy, Helios has the potential to tip the technological scales of surveillance in the inmate's favor. This would lead to a more complete record of the solitary confinement experience.

