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ARTICLE

On the Legal Status of Human Cerebral Organoids: Lessons from Animal Law

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Abstract

This paper will ask whether the legal status presently afforded to nonhuman animals ought to influence regulatory debates concerning human cerebral organoids. The New York Courts recently refused to grant a writ of habeas corpus to Happy the Elephant as she was property rather than a legal person while at the same time accepting that she is a moral patient deserving of rights protection. An undesirable situation has therefore arisen in which the law holds a being with moral status to be incapable of benefitting from legal redress due to their legal status as property.

The author argues that this is something that we ought to avoid when designing the regulatory framework which will govern the use of human cerebral organoids. Yet, a difference exists in that, whereas the judges already accept Happy is a moral patient, there is presently no consensus around the moral status of organoids. This paper will consider whether human cerebral organoids have passed the moral threshold of sentience. If they have, or are close to doing so, regulators ought to consider their legal status in advance so as to ensure that adequate limitations are placed on this usage so as to avoid unethical practices.

Keywords: human cerebral organoids; sentience; animal law; legal personhood

Introduction

On Saturday June 11, 2022, *The Washington Post* published a story in which Google engineer Blake Lemoine claimed that an AI named LaMDA[1] had achieved sentience and was morally deserving of the personhood they claimed to possess.[2] The Internet was soon, and perhaps predictably, ablaze with commentary—both from those who supported Lemoine's conclusion that LaMDA's sentience meant it was capable of making legitimate rights claims, and those, such as Microsoft VP and Chief Data Scientist Juan M. Lavista Ferres, who thought the claim was nonsense.[3] The debate covers familiar territory, given that the possession of sentience is widely accepted as a threshold capacity beyond which rights can legitimately be claimed.[4] Yet, for those of us working in the field of animal law, what was of note in discussions around LaMDA was not whether it had passed this threshold. Rather, we noted an uneasy disconnect between the ease with which commentators speculated about how AI sentience may affect our future legal relationships with artificial beings, although the same attention was not given to rights claims that could be made by the billions of biological beings we know to be sentient and with whom we share our planet here and now.

The purpose of this paper is to apply this observation to the problem of how we ought to approach the legal status of human cerebral organoids, and how this ought to be considered when designing future regulation concerning their usage. It will do so in two main parts. First, the case of Happy the Elephant will be used as a case study to demonstrate a key fault with how the law presently interacts with nonhuman animals: that our institutions often accept that such creatures are capable of making legitimate claims to moral patienthood, but that the law claims to be powerless to address this problem

due to their status as property.[5] It will be argued that it is at least desirable that regulators take reasonable steps to prevent the same problem from arising with regards to human cerebral organoids—whether as standalone entities or as part of chimera resulting from their implementation in nonhuman hosts.

This would require us to make an assessment of whether such organoids are to be seen as moral patients, and it is to this task that the second half of the paper will turn. It will be argued that current scientific evidence raises sufficient uncertainty around whether the threshold of sentience has been passed to warrant the use of precautionary reasoning, meaning that the moral status of human cerebral organoids should be of primary concern to regulators when considering whether limits ought to be placed on their usage.

A case study from animal law

How the law interacts with nonhuman animals is the proverbial elephant in the room, in that it is often overlooked in discussions of how the law does, or ought, to interact with what David Lawrence has labeled "novel beings."[6] The first section of this paper will thus begin by introducing an actual elephant, whose recent day in court exposes a real and identifiable problem concerning the legal status of nonhuman animals. It does so with the aim of demonstrating that animal law can provide lessons on how the law ought to interact with potential moral patients such as human cerebral organoids, and in particular identify issues that regulators can take steps to address before they raise both legal and moral difficulties in future research.

Introducing Happy

Happy is a 47-year-old Asian elephant who has been resident at the Bronx Zoo for just over 40 years,[7] the last 15 of which have been spent alone since the death of her companion.[8] In 2005, she became the first Asian elephant to recognize herself in a mirror, which scientists believe provides strong evidence that she is self-aware and possesses advanced cognitive capabilities.[9] Elephant behavioral experts believe that these abilities evolved due to the fact wild elephants live in large social groups and to roam for up to 20 hours per day, and their isolation and confinement can therefore be linked to a range of mental and physical ailments including, but not limited to, depression, arthritis, and osteomyelitis.[10]

Her legal journey began in 2018.[11] A petition for a writ of habeas corpus[12] and order to show cause was submitted on her behalf by the Nonhuman Rights Project (NhRP),[13] who describe themselves as the only civil rights organization in the United States "dedicated solely to securing rights for nonhuman animals."[14] Their petition argues that Happy's self-awareness and advanced cognitive abilities are evidence that she is capable of enjoying liberty and autonomy, and thus capable of benefiting from the writ of habeas corpus being sought. They claim that this constitutes sufficient evidence of her moral worth to render her detention unlawful in itself, rather than simply the conditions in which she lives.[15] Her case made history in December 2018 when Judge Tracey Bannister decided that there was a case to answer and issued an order to show cause.[16] This was only the second time such an order had been made on behalf of a nonhuman animal in U.S. history, and the first time that such an order had been made on behalf of an elephant.[17]

The case and its outcome

The legal problem faced by the NhRP is a long-standing doctrine, accepted by most jurisdictions, that in order to be capable of bearing rights, one first needs to be recognized as a legal person. On an orthodox understanding, this is a strictly legal classification, and should be seen in opposition to the legal status of "property." On this orthodox understanding then, the question the courts are being asked when confronted with a rights claim is one of Happy's legal status: Is she a legal person and thus capable of bearing rights, or property that is not?[18]

Although contemporary scholarship questions the soundness of the orthodox view,[19] it is accepted by the courts in New York who, when previously asked to recognize rights for two chimpanzees named Tommy and Kiko, refused to do so because of their property status.[20] In the court of first instance, Judge Alison Tuitt accepted that this rule applied to Happy and dismissed the claim.[21] This decision was appealed by the NhRP, but was upheld by a 15-line judgment of the appellate court that is notable in that —rather than engage with the substantive merits of the case—it merely repeated that Happy was not a legal person and that the issue of whether she ought to be was for the legislature.[22] This decision was further appealed to the Court of Appeals in Albany, who in 2021 agreed to hear the case—making this is the first time a nonhuman habeas corpus claim has reached the highest court of any English-speaking jurisdiction.[23]

Lessons to be learned

Following a hearing on May 18, 2022,[24] the Court published its decision on June 14 and rejected the appeal by 5-2.[25] Writing for the majority, Chief Judge DiFiore held that—whatever the merits of the case —public policy considerations meant that previous courts' decisions to defer the question of nonhuman rights to the legislature were correct.[26] Although the decision was clear, what is less clear is whether the reasons provided by DiFiore can support this conclusion. First, with reference to Art 1 §4 of the New York State Constitution, she suggested that habeas corpus was a procedural vehicle available open only to human beings,[27] yet the provision referenced makes no reference to human beings—but rather to persons.[28] As the question DiFiore was being asked by the NhRP is whether Happy *was* a legal person, her reason begs the question it attempts to answer and cannot support her conclusion. Her second reason for denying Happy's legal personhood was that in order to be a legal person and benefit from rights, one also needs to be capable of understanding and bearing duties, and as Happy cannot do the latter, she cannot benefit from the former.[29] This is simply not the case as a matter of legal fact, as can be demonstrated by the fact that legal systems have no problem with recognizing children as legal rights bearers while holding them not bound by certain duties—for example, through imposing a minimum age requirement for criminal liability.[30] Given it is perfectly possible for the law to recognize a being can bear rights but not duties, this reason is also incapable of supporting DiFiore's conclusion. A third reason provided is that recognizing rights for Happy would destabilize society—something that is undoubtedly true, but does not address the legal question before the court.[31] It also seems less appealing as a justification when we recognize it to be equivalent to the claim that the comfort of the majority ought not to be destabilized by the recognition of rights for a previously marginalized group.

Given these reasons are incapable of supporting the majority conclusion, we must conclude that it is her final justification that is doing the heavy lifting—that the question of rights for nonhuman animals is primarily a political question, and ought to be answered by the legislature. [32] This point was emphatically rejected by two dissenting judges. Judge Wilson noted as part of his seventy-page dissent that the common law is uniquely placed to develop in a way that addresses new beliefs, knowledge, and challenges, such as those posed by our increased awareness of elephant capacities,[33] arguing that to deny Happy is to denigrate "the human capacity for understanding, empathy, and compassion."[34] In a concurring judgment, Judge Rivera adds that she finds the majority position unpersuasive:

> This is question begging in its purest form. The majority's argument boils down to a claim that animals do not have the right to seek habeas corpus because they are not human beings and that human beings have such a right because they are not animals.[35]

Furthermore, the dissenters hold that the majority decision to defer to the legislature is an abrogation of their duty, in the absence of legislation, to respond to the question before them on common law as opposed to legislative principles. As put by Rivera, judges should not forget that "The common law is our bailiwick."[36]

What is of note is that all majority and dissenting judgments accept that Happy is a being with advanced capacities that may mean she is deserving of rights protection. This point has been accepted in an older judgment from New York, in which Judge Eugene Fahey expressed his unease in denying rights to a chimpanzee named Tommy for no other reason than his status as property. He noted that this conclusion ought not to be seen as "a decision on the merits of [the] petitioner's claims."[37] and suggested that the advanced cognitive capacities of certain nonhuman animals ought to be recognized as a more acceptable starting point for assessing rights claims than the designation of legal person.[38] He suggested that focusing on legal status to the exclusion of these factors ignored the moral status that such cognitive abilities evidenced, and to deny rights claims because of legal status was "a refusal to confront a manifest injustice"[39] insofar as it amounts to a refusal to accept that an "intelligent nonhuman animal who thinks and plans and appreciates life as human beings do" ought to benefit from rights to protect this capacity.[40]

The lesson here is clear: Judges accept that Happy and other nonhuman animals are moral patients who can make legitimate moral rights claims,[41] but claim to be unable to legally recognize this unless the legislature explicitly allows them to do so—whether through recognition of legal personhood or other means. Until this happens, the law is clearly deficient insofar as it claims to be powerless to legally protect the interests of beings it recognizes have legitimate moral rights claims.[42] This point should be at the forefront of regulatory debates concerning the legal status of human cerebral organoids.

A lesson for regulation of human cerebral organoids

The preceding section has demonstrated that the courts see regulators as being uniquely placed to address questions as to the legal status of novel beings, whether nonhuman animals or human cerebral organoids. Yet, a difference exists between the two, in that whereas judges accepted that Happy was a moral patient, there is no consensus on the moral status of human cerebral organoids.

Given that sentience is widely accepted as an indicator of moral worth, this section will use this approach as a test by which the moral status of human cerebral organoids—whether as standalone entities or as chimera resulting from their implantation in nonhuman hosts—can be ascertained. Only once this question has been answered can we consider whether lessons can be learned from animal law with regard to their regulation and legal status.

The Nature of Human Cerebral Organoids

Human cerebral organoids, first developed around 2008 but known by this name since 2013,[43] are "three-dimensional structures created by imitating the process of organ formulation in vitro using pluripotent stem cells, such as induced pluripotent stem cells and embryonic stem cells."[44] They are not and were never intended to be mini-brains; they are merely models of specific regions of the brain, and discussions as to their moral status ought to fully understand this limitation.[45] Organoids can exist as standalone entities in vitro, or be grafted onto living or artificial hosts, and Sawai et al. argue that separate moral questions are raised by each of these scenarios.[46] The sentience framework endorsed here, however, rejects this assessment, as the sole criterion that needs to be established when addressing moral status is its sentience as a standalone in vitro entity, or the sentience of any chimera that results from its integration with a living or artificial host.

Yet this focus on sentience is not uncontroversial; some believe that, as a concept relating to both body and mind, sentience cannot be measured with enough certainty to successfully ground a moral duty—particularly in the face of moral pluralism.[47] Others argue that even if we can be sure some beings are sentient, this philosophical standard is not where most people see moral value—instead preferring either theological or biological determinants. As put by John Evans with regard to sentient animals, "…short of a talking monkey, the public is not very concerned about [their] capacities."[48] Despite these reservations, it remains true that legislators do see either sentience or consciousness as a proxy for moral concern that ought to be legally reflected, and there is a clear direction of travel in this regard as concerns animal welfare.[49]

There is, however, no consensus on whether human cerebral organoids are sentient or conscious. As standalone entities, they are unable to vascularize, meaning that growth is limited to relatively simply structures;[50] they simply do not have the blood vessels required to reach greater size and complexity, "resulting in a necrotic core that hinders development and durations."[51] As such, even though evidence exists to suggest that they exhibit neural connections and engage in electrical activity, "they have so far failed to form even basic synaptic circuits—without which consciousness is probably impossible."[52] If this is true, then organoid sentience is a problem for the future, and their property status and use "does not raise ethical concerns beyond those associated with our treatment of human biospecimens more generally."[53]

Yet, the problem of vascularization is readily overcome by grafting said organoids to an animal host.[54] Technological developments now mean that organoids grafted in this way have greater survival rates,[55] and have potentially developed complex structures needed for sentience or consciousness to develop.[56] Recent evidence even suggests that grafted organoids can influence host behavior in unexpected ways.[57] Similar issues have also been highlighted in research involving in vitro organoids as standalone entities; studies have evidenced complex neural activity consisting of synchronized oscillation with individual firing in neural networks,[58] and have reproduced a waveform similar to those seen in preterm neonatal electroencephalography.[59] Though unable to sense the external world, research also shows that some organoids can respond to external stimuli in a meaningful way—allowing researchers to conclude that, even if we are not there yet, sentience or consciousness may not be far away.[60] And though dismissed by some as unhelpful hype, some studies even claim that organoids are capable of "playing" games or otherwise engaging with enactive learning when plugged into virtual worlds.[61]

Such evidence might be as good as we are going to get with regard to ascertaining organoid sentience. Given that they are generally cutoff from sources of perceptive input and/or motor output in their own right, it is difficult to observe sentience or consciousness with absolute certainty. This is made even more difficult by the lack of consensus on what sufficient evidence may even look like, with large divergence on what constitutes relevant neural correlates of conscious experience (NCCs) even in humans.[62] Thus, even though evidence of organoid sentience is at best inconclusive, we cannot dismiss it out of hand.

A precautionary principle

Given this uncertainty, the research community is divided on whether regulation should promote continued organoid research[63]—especially as the alternative would be to prolong research on nonhuman animals whose sentience and moral status are more settled[64]—or explore alternatives.[65]

This uncertainty, in part stemming from the fact that concrete identification of sentience or consciousness is difficult to do with certainty,[66] means that the use of precautionary reasoning is desirable. This approach is already a common practice with regard to use of nonhuman animals where uncertainty over moral status may "delay the adoption of proportionate measures to protect those animals from severe welfare threats."[67] The basic operation of this approach begins from a statement that if we are confronted with a being whose sentience (and therefore moral status) is uncertain, the following is true:

a) If the being is sentient and has moral status, then:
   i. If the observer treats them in a way that respects this, the observer's behaviour is permissible.
   ii. If the observer treats them in a way that does not respect this, the observer's behaviour is morally impermissible.
b) If the being is not sentient and does not have moral status, then:
   i. If the observer treats them in way that respects this, the observer's behaviour is permissible.
   ii. If the observer treats them in a way that does not respect this, the observer's behaviour is morally permissible.

As it is morally desirable that we avoid behavior that does not respect moral status, we ought to avoid outcome **(a)ii** in the above scenario. Given that their sentience is uncertain, we must ask whether there is sufficient evidence for us to believe that human cerebral organoids *might* be sentient. If there is, then we are required to treat them as though they are in order to ensure we avoid outcome **(a)ii** "to the extent that it is possible and meaningful … to do so."[68]

Jonathan Birch and Heather Browning would agree with this approach, and endorse the following use of the precautionary principle with regard to human cerebral organoids:

> [I]f an organoid contains structures or mechanisms that any serious and credible theory of the human NCCs posits to be sufficient for conscious experience, we should take proportionate measures to regulate research on that organoid.[69]

They acknowledge that this is a low threshold, but such is the inescapable nature of precautionary thinking—which "requires us to take seriously theories of consciousness that cannot be ruled out on the basis of current evidence, even if they do not command strong positive evidential support."[70] The evidence in favor of *in vivo* or *in vitro* organoid sentience contained in the previous section, though inconclusive, appears to indicate that we may be close to this threshold being passed—if it has not been already. We should therefore see such organoids as moral patients, and it is desirable that this be reflected in regulatory circles.

Factoring this into regulatory debate

Having established this, we can now finally turn to the question posed by the title of this piece: whether animal law can provide lessons as to how regulation ought to take organoids' moral patienthood into account. Søren Holm and Jonathan Lewis argue that there is no legal problem with owning sentient or conscious beings, as the law allows us to own nonhuman animals for both companionship and instrumental purposes as pets and livestock. As such, they argue that there is no de facto reason to see organoids as legally different to nonhuman animals.[71] Yet, as has been shown in part one of this paper, the way the law treats nonhuman animals is clearly deficient. Their property status has been shown to lead to a problem where moral patients are denied protection of their interests, so regulators ought to learn from this and future proof the law relating to organoids in order to avoid replicating this problem. Put simply: if there is a likelihood that human cerebral organoids possess sentience or consciousness, then not only are there moral limits on what we can do to them, it is highly desirable that this be reflected through appropriate regulation.[72]

This ought not to be a problem, since—as noted above—there is already a clear direction of travel with regulation of nonhuman animal interests when they are used in laboratory research, whereby sentience is seen as a direct proxy for moral worth deserving of specific legislative protection.[73] An initial recommendation from Birch and Browning is one that should be endorsed as a minimum; that organoids should be brought under protection equivalent to that offered to nonhuman animals used in laboratories in the UK by the Animals (Scientific Procedures) Act 1986, "requiring ethical review, a careful weighing of harms and benefits, and evidence that scientists have duly considered the imperative to reduce, refine, and replace." [74] These principles are known as the three Rs, and have been well-established principles in research involving nonhuman animals for some time.[75]

Yet, as has been noted above, this is weak protection that does not address property status does not adequately protect nonhuman animals' moral rights claims and, as such, does not go far enough. Given that there is sufficient evidence for us to take the potential for human cerebral organoid sentience seriously and employ precautionary reasoning, regulation ought to be much stricter in considering their potential for moral rights if we are to avoid the same legal issues currently faced by Happy. Claims that such an ethics-led approach is undesirable or unworkable due to the fact of ethical pluralism, though well intentioned, are misplaced[76]; the Warnock Report in the UK shows that ethics-led approaches are an effective means by which the moral and legal status of novel beings can be ascertained.[77] A similarly

wide-ranging enquiry would therefore be desirable with regard to establishing the moral and legal status of both in vivo and in vitro human cerebral organoids.

Conclusion

This paper has attempted to present a cautionary tale. When we consider the moral status of new biotechnologies, our comparator ought not be new and speculative technology such as LaMDA. We can better see future regulatory problems if we look at how the law interacts with beings whose moral status is comparatively settled. The recently settled case of Happy the elephant shows us that there is presently a stark disconnect: The courts are happy to accept that she is a moral patient whose interests are deserving of legal protection, but they do not wish to take the steps necessary to do so. The law is clearly failing Happy, and it is surely better that regulators take proactive steps to avoid this problem when faced with beings such as human cerebral organoids.

Conflicts of Interest. The author declares none.

Notes

1. LaMDA is the name given to Google's system for building chatbots, and stands for Language Model for Dialogue Applications.
2. Tiku N. The Google engineer who thinks the company's AI has come to life. *The Washington Post* 2022 June 11; available at https://www.washingtonpost.com/technology/2022/06/11/google-ai-lamda-blake-lemoine/ (last accessed 13 June 2022).
3. Lavista Ferres JM. Let's repeat after me, LaMDA is not sentient. LaMDA is just a very big language model with 137B parameters and pre-trained on 1.56T words of public dialog data and web text. It looks like human, because is trained on human data. *Twitter* 2022 June 12; available at https://twitter.com/BDataScientist/status/1535985643741777920?s=20&t=4-V5ZrLzLoI5z-eSaIaunQ (last accessed 13 June 2022).
4. Browning H, Veit W. The sentience shift in animal research. *The New Bioethics* 2022;28:299–314. doi:10.1080/20502877.2022.2077681.
5. I have previously argued that this position is at best undesirable, and at worst creates uncertainty around the validity of the legal rules in question. See Jowitt J. The desirability of legal rights for novel beings. *Cambridge Quarterly of Healthcare Ethics* 2021;**30**(3):504–16.
6. Lawrence D, Brazier M. Legally human? "Novel beings" and English law. *Medical Law Review* 2018;**26**(2);309. The full scope of the term can perhaps be seen in David Lawrence and Sarah Morley, eds. *Novel Beings: Regulatory Approaches for a Future of New Intelligent Life*. Cheltenham: Edward Elgar; 2022.
7. Wise SM. The struggle for the legal rights of nonhuman animals begins—the experience of the nonhuman rights project in New York and Connecticut. *Animal Law* 2019;**25**:367–93, at 382.
8. Tullis T. The Bronx Zoo's loneliest elephant. *The New York Times* 2015 June 26; available at https://www.nytimes.com/2015/06/28/nyregion/the-bronx-zoos-loneliest-elephant.html (last accessed 26 Mar 2021).
9. Plotnik JM, de Waal FBM, Reiss D. Self-recognition in an Asian elephant. *Proceedings of the National Academy of Sciences of the United States of America* 2006;**103**(45):17053.
10. Poole Affidavit of Oct 1, 2018 in connection with the petition for a writ of habeas corpus and order to show cause, *NhRP Inc. (On behalf of Happy) v. Breheny and Wildlife Conservation Society* Index No: 18-45164, 4; available at https://www.nonhumanrights.org/content/uploads/Affidavit-Joyce-Poole-Scan-1-Oct-2018-at-14.13.pdf (last accessed 6 Jan 2021).
11. For a full account of the litigation, including supplementary documentation provided to the courts at each step, see Nonhuman Rights Project. Client, Happy (Elephant): First elephant to pass mirror self-recognition test; held alone at the Bronx Zoo. *Nonhuman Rights Project* 2018 Oct 2; available at https://www.nonhumanrights.org/client-happy/ (last accessed 21 June 2022).

12. Habeas corpus is a common law right that protects the bearer from arbitrary detention. Once a petition is made to the court, it is up to the detainer to demonstrate that they have a lawful ground under which they can detain the detainee. Should no lawful reason be identified, the detainee would be freed. See note 3, Bl Comm 328-329.
13. Petition for a writ of habeas corpus and order to show cause. *NhRP Inc. (On behalf of Happy) v. Breheny and Wildlife Conservation Society*. Index No: 18-45164; available at https://www.nonhumanrights.org/content/uploads/Happy-Petition-10.1.18.pdf (last accessed 16 Dec 2020).
14. Nonhuman Rights Project. A unique and vital mission. *Nonhuman Rights Project* 2016 May 7; available at https://www.nonhumanrights.org/ (last accessed 27 Mar 2021).
15. See note 13, Petition for a writ of habeas corpus and order to show cause 2020.
16. Order to show cause granted in response to the petition for a writ of habeas corpus and order to show cause. *NhRP Inc. (On behalf of Happy) v. Breheny and Wildlife Conservation Society*. Index No: 18-45164; available at https://www.nonhumanrights.org/content/uploads/Order-to-Show-Cause-Happy.pdf (last accessed 4 Jan 2021).
17. Kotzmann J, Pendergrast N. Animal rights: Time to start unpacking what rights and for whom. *Mitchell Hamline Law Review* 2019;**46**:157–200, at 178.
18. Author unknown. What we talk about when we talk about persons: The language of a legal fiction. *Harvard Law Review* 2001;114:1745.
19. Kurki V. *A Theory of Legal Personhood*. Oxford University Press; 2019.
20. *Nonhuman Rights Project, Inc. on Behalf of Tommy v. Lavery*. 31 N.Y.3d 1054 (2018). See also decisions of the lower courts in *Nonhuman Rights Project, Inc. ex rel. Tommy v. Lavery*, 54 N.Y.S.3d.392 and *People ex rel. Nonhuman Rights Project, Inc. v. Lavery* 998 N.Y.S.2d.248 (2014).
21. *Nonhuman Rights Project on behalf of Happy v. Breheny* 2020 WL 1670735, Tuitt JSC at 9.
22. *Nonhuman Rights Project Inc. on behalf of Happy v. Breheny* 189 A.D.3d 583, 189 (2020).
23. Nonhuman Rights Project. New York Court of Appeals agrees to hear landmark elephant rights case. *Nonhuman Rights Project* 2021 May 4; available at https://www.nonhumanrights.org/blog/appeal-granted-in-landmark-elephant-rights-case/ (last accessed 10 Aug 2021).
24. The full hearing can be found at Nonhuman Rights Project. The fight to #FreeHappy. *Nonhuman Rights Project* 2022 May 18; available at https://www.nonhumanrights.org/blog/Highlight_Page/the-fight-to-freehappy/ (last accessed 13 June 2022).
25. *Matter of Nonhuman Rights Project, Inc. v. Breheny* 2022 NY Slip Op 03859.
26. See note 25, Fiore CJ, majority op at 17.
27. See note 25, Fiore CJ, majority op at 6.
28. Article 1 §4 of the New York State Constitution; available at https://www.nysenate.gov/sites/default/files/ckeditor/Sep-22/586_ny_state_constitution_-_generic_version.pdf (last accessed 2 Dec 2022).
29. See note 25, Fiore CJ, majority op at 10–11.
30. The law of England and Wales holds that no child under the age of 10 can be convicted of a criminal offense as they cannot understand the correctness of their actions and, as such, it would be unjust to impose such a duty upon them. See Children and Young Persons Act 1933 s 50, as amended by Children and Young Persons Act 1963 s 16(1).
31. See note 25, Fiore CJ, majority op, at 12.
32. See note 31, Fiore CJ, majority op, at 17.
33. See note 31, Wilson J, dissenting op, at 37, 52.
34. See note 31, Wilson J, dissenting op, at 70.
35. See note 31, Rivera J, dissenting op, at 10.
36. See note 31, Rivera J, dissenting op, at 11.
37. *Nonhuman Rights Project, Inc. on behalf of Tommy v. Lavery*, 31 N.Y.3d 1054, 1056 (2018) Fahey J.
38. See note 37, Fahey J, at 1057.
39. See note 37, Fahey J, at 1059.
40. See note 37, Fahey J, at 1058.
41. Andrews K, Comstock G, Crozier GKD, Donaldson S, Fenton A, John TM, et al. *Chimpanzee Rights: The Philosophers' Brief*. Abingdon(Oxon): Routledge; 2019.

42. See note 5, Jowitt 2021.
43. Sawai T, Hayashi Y, Niikawa T, Shepherd J, Thomas E, Lee T-L, et al. Mapping the ethical issues of brain organoid research and application. *AJOB Neuroscience* 2022;**13**(2):81–94, at 82.
44. See note 43, Sawai et al. 2022, at 81.
45. Gaillard M, Botbol-Baum M. Pursuit of perfection? On brain organoids as models. *AJOB Neuroscience* 2022;**13**(2):79–80; Chinaia A, Lavazza A. Cerebral organoids and biological hybrids as new entities in the moral landscape. *AJOB Neuroscience* 2022;**13**(2):117–18.
46. See note 43, Sawai et al. 2022, at 82–3.
47. Stoeklé H-C, Ivasilevitch A, Marignac G, Hervé C. Ethical issues of brain organoids: Well beyond "consciousness"? *AJOB Neuroscience* 2022;**13**(2):109–11, at 109–10.
48. Evans JH, The public's ethical issues with brain organoid research and application. *AJOB Neuroscience* 2022;**13**(2):101–3, at 101–2.
49. See most recently the UK's Animal Welfare (Sentience) Act 2022. For a more thorough account, see note 4, Browning and Veit 2022, at 2.
50. Rossi G, Manfrin A, Lutolf MP. Progress and potential in organoid research. *Nature Reviews Genetics* 2018;**19**(11):671–87.
51. See note 45, Chinaia and Lavazza 2022.
52. Lavazza A, Massimini M. Cerebral organoids: Ethical issues and consciousness assessment. *Journal of Medical Ethics* 2018;**44**(9):606–10.
53. Koplin J, Savulescu J. Moral limits of brain organoid research. *Journal of Law, Medicine and Ethics* 2019;**47**(4):760–7, at 761.
54. Chen HI, Wolf JA, Blue R, Maggie Song M, Moreno JD, Ming G-L, et al. Transplantation of human brain organoids: Revisiting the science and ethics of brain chimeras. *Cell Stem Cell* 2019;**25**(4):462–72; See note 43, Sawai et al. 2022, at 82; Mansour AA, Gonçalves JT, Bloyd CW, Li H, Fernandes S, Quang D, et al. An *in vivo* model of functional and vascularized human brain organoids. *Nature Biotechnology* 2018;**36**:432.
55. Daviaud N, Friedel RH, Zou H. Vascularization and engraftment of transplanted human cerebral organoids in mouse cortex. *eNeuro* 2018;5(6). doi:10.1523/ENEURO.0219-18.2018.
56. Kitahara T, Sakaguchi H, Morizane A, Susumu Miyamoto TK, Takahashi J. Axonal extensions along corticospinal tracts from transplanted human cerebral organoids. *Stem Cell Reports* 2020;**15**(2):467–81.
57. Camp JG, Treutlein B. Human brain organoids influence rat behaviour. *Nature* 2022;610:265–6.
58. Sakaguchi H, Ozaki Y, Ashida T, Matsubara T, Oishi N, Kihara S, et al. Self-organized synchronous calcium transients in a cultured human neural network derived from cerebral organoids. *Stem Cell Reports* 2019;**13**(3):458–73.
59. Trujillo CA, Gao R, Negraes PD, Gu J, Buchanan J, Preissl S, et al. Complex oscillatory waves emerging from cortical organoids model early human brain network development. *Cell Stem Cell* 2019;**25**(4):558–69.
60. Buchanan M. Organoids of intelligence. *Nature Physics* 2018;**14**:634.
61. See, respectively, Zuk P, Stertz L, Walss-Bass C, Lázaro-Muñoz G. Research comparing iPSC-derived neural organoids to *ex vivo* brain tissue of postmortem donors: Identity after life? *AJOB Neuroscience* 2022;**13**(2):111–13, at 111–12; Kagan BJ, Duc D, Stevens I, Gilbert F. Neurons embedded in a virtual world: Evidence for organoid ethics? AJOB Neuroscience. 2022;**13**(2):114–17.
62. Birch J, Browning H. Neural organoids and the precautionary principle. *The American Journal of Bioethics* 2021;**21**(1);56–8, at 57.
63. See note 45, Chinaia and Lavazza 2022; see note 43, Sawai et al. at 82; see note 53, Koplin and Savulescu 2019, at 761.
64. See note 61, Kagan et al. 2022, at 115–16.
65. Koplin JJ, Savulescu J. Time to rethink the law on part-human chimeras. *Journal of Law and the Biosciences* 2019;**6**(1):37–50; Lavazza A. Human cerebral organoids and consciousness: A double edged sword. *Monash Bioethics Review* 2020;**38**:105–28.
66. Nagel T. What is it like to be a bat? *The Philosophical Review* 1974;**83**(4):435–50; Sebo J. The moral problem of other minds. *Harvard Review of Philosophy* 2018;**25**:51–70.

67. See note 71, Birch and Browning 2022; see also Birch J. Animal sentience and the precautionary principle. *Animal Sentience* 2017;**16**(1). doi:10.51291/2377-7478.1200; Browning H. Anecdotes can be evidence too. *Animal Sentience* 2017;**16**(13). doi:10.51291/2377-7478.1246.
68. Beyleveld D. The principle of generic consistency as the supreme principle of human rights. *Human Rights Review* 2012;**13**(1):9–10.
69. See note 62, Birch and Browning 2021, at 57.
70. See note 62, Birch and Browning 2021, at 57.
71. Holm S, Lewis J. Donation, control and the ownership of conscious things. *AJOB Neuroscience* 2022;**13**(2):106–8, at 107.
72. A similar point is made by Birch and Browning 2021 (see note 62), at 56.
73. See note 49.
74. See note 62, Birch and Browning 2021, at 57. See also note 53, Koplin and Savulescu 2019, at 763.
75. Russell WMS, Burch RL. *The Principles of Humane Experimental Technique*. London: Methuen; 1959.
76. Such a claim is made by Stoeklé et al. 2022 (see note 47), at 110.
77. Department of Health and Social Security, Report of the Committee of Inquiry into Human Fertilisation and Embryology (Cmnd 9314, 1984).

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