Appendix

Table 6: Search results summaries

Author(s)	Date	Summary
Abdullah	2018	Abdullah sees robot rights that also protect human interests as "legal necessity" and as "in line with the objectives of Islamic Law." Abdullah comments that, "the criterion of bearing rights and duties in Islamic law," which is known as "ahliyyah," would not apply to robots. Liability for their actions would be "ascribed to the owner or manufacturer of the robot," though this could change with the technology.
Adam	2008	Adam summarizes "the ways that Information Ethics (IE)," developed by Floridi, "treats things." Most of the discussion focuses on agency rather than patiency.
Akechi et al.	2018	This study compared how 33 autistic and 45 non-autistic participants ascribed agency and experience to a variety of different types of entity. For both groups, robots were ascribed moderate agency (greater than dogs or human infants) but very low experience (similar to rocks). Attributions of "[m]oral blame positively correlated with agency, whereas moral consideration positively correlated with experience."
Al-Fedaghi	2007	Al-Fedaghi takes Floridi's Information Ethics further "by conferring moral value on personal information itself" and "moral consideration to the well-being of any personal information based on the moral concern for the welfare of its proprietor."
Allen and Widdison	1996	Allen and Widdison consider computer contracts and legal personality from the perspective of protecting the computer's users, including for convenience reasons. They encourage making some computer-generated agreements enforceable for the sake of "commercial pragmatism." The legal precedent of personhood for other entities is considered, with autonomy being the relevant criterion; they see legal personality as "legally appropriate" at "a point" in the future.
Anderson	2012	Referring to "a family of theories we will refer to as 'functional intentionality,'" Anderson argues that a machine "must first be shown to possess a particular moral status before it is a candidate for having genuine intentionality."
Andreotta	2020	Andreotta argues that consciousness is a more important criterion for grounding "AI rights" than "superintelligence" or empathy. Andreotta argues that, "AIs can and should have rights—but only if they have the capacity for consciousness." The "Hard Problem" of consciousness is seen as a key epistemic problem impeding "the AI rights research program."
Armstrong et al.	2012	Armstrong, Sandberg, and Bostrom look an "Oracle AI" approach to solving various AI issues. Discussing mind crime, they note that, "[i]t would be ideal if there were a specific level of detail beyond which the simulation would be conscious, and before which it is not," but that achieving this would be difficult and the Oracle AI's "answers may be inaccurate."
Arnold and Gough	2017	Arnold and Gough depictions of personhood in several different films, with a focus on AI and robots.
Asaro	2001	This is a review of a book by Hans Moravec, "a leading researcher in robotics," about a future where robots control the earth; Asaro describes it as "neither science nor fiction." The book is criticized as giving only cursory and unconvincing discussion of many topics, including the moral consideration of artificial entities. Moravec apparently "argues that we should keep the robots enslaved... yet also makes the point that robots will be just as conscious and sensitive as humans."
Asekhauno and Osemwegie	2019	This article "argues that each level of being," including animals, plants, and AI "possesses some rights associated with it. It argues further that either all beings have rights, or they don't." It argues that accepting that these beings possess rights "poses the most existential and ontological threat to humanity and all of nature."
Ashrafian	2015a	Ashrafian addresses the question of, "if robots do have rights, how should they interact with each other?" Various rights are proposed and compared to the universal declaration of human rights. Ashrafian argues for "a universal law of rights to recognise inherent dignity and the inalienable rights of artificial intelligences." The suggestions are only intended to apply to the interaction between sentient robots and AI.
Ashrafian	2015b	Ashrafian focuses on outlining some philosophical considerations for determining robot responsibilities. Subsequently, Ashrafian briefly considers Roman law precedent to consider the rights that robots might have, noting that, as with Roman rights for slaves, the rights of robots might gradually expand over time, for practical reasons.
Barfield	2015	In this chapter, Barfield explores "whether the appearance of cyborgs and artificially intelligent machines will lead to discrimination from humans and if so, what laws exist to provide protection." Barfield argues that artificial entities could be given serious consideration for legal personhood within "a few decades."
Barfield	2018	"This paper reviews product liability and negligence tort law which may be used to allocate liability for robots that damage property or cause injury." Different approaches to allocating liability are evaluated. The author concludes that, "[r]ights for robots may happen eventuality, but for now, determining liability for autonomous robots remains difficult."
Bartneck and Keijsers	2020	After viewing videos of violence and abuse towards either a human or a robot, there was no significant difference between participant's ratings of "the moral acceptability of the action, the violence depicted, the intention to harm, and how abusive the action was" but "[h]umans fighting back were seen as less immoral compared with robots fighting back."

Basl	2013a	Basl argues that, "engaging in artificial consciousness research... might be unethical on grounds that it wrongs or will very likely wrong the subjects of such research." The focus is on machines that are not "very much like us" or integrated into society. Interests and consciousness are seen as relevant criteria for patiency; Basl sees these as possible. Basl argues from both a deontological and consequentialist perspective.
Basl	2013b	This article makes similar arguments to Basl's (2014) article. Several short thought experiments are used to critique alternative views, such as the use of religious views for determining moral patiency.
Basl	2014	The author argues that "current machines" do not possess the interests that would make them "moral patients," even if you assume that, "consciousness is not always a necessary condition for having welfare." However, "[o]nce artificial consciousnesses exist," they will have interests that make them moral patients.
Beckers	2018	Beckers argues that, "even if we have good reason to believe that it is very unlikely, the mere possibility of humanity causing extreme suffering to an AI is important enough to warrant serious consideration." Bekker notes that there is a technological assumption ("that an AI could become superintelligent") and an ethical assumption ("that an AI could suffer"). Bekker argues that, "the possibility for an AI to experience supersuffering takes precedence over the expected benefits that an AI will produce for mankind" and that, "[h]umanity should not attempt to create a conscious AI."
Belk	2018	Belk explores "who and what may be owned and by whom or what." Belk argues that, with "consciousness, self-awareness, sentience, and sapience... It is quite imaginable that human-appearing and human-acting robots will be granted similar or greater protections than those now extended to animals."
Bennett and Daly	2020	Bennett and Daly consider whether robots and AI "should be considered as legal persons." They "analyse the regulatory issues raised by robot rights through three questions: (i) could robots be granted rights? (ii) will robots be granted rights? and (iii) should robots be granted rights?" Previous contributions are summarized; the authors do not argue for particular answers to these questions.
Beno	2019	Beno includes "a literature review on the extent and nature of robots and robot rights." They then conducted a survey of 647 Slovak citizens, which found "a higher acceptance of the use of robots in everyday life... and in households than in the work environment," though no questions were asked directly about robot rights."'
Bess	2018	Bess proposes "three moral categories" of future nonhumans -- "animals," "persons," and "presumed persons" -- the latter two of which could include some (at least partly) artificial entities. Bess emphasizes "dignity" and "equality among all persons," so argues that full personhood is not necessary for rights. Bess also argues that sentient artificial entities could possess the same rights as humans.
Bigman et al.	2019	The authors summarize moral psychology research on human perceptions of various robot capabilities, mostly relating to robot agency, with a brief discussion of robot rights. They note that "mind perception" predicts moral judgments and that people already perceive machines as having some relevant capabilities.
Biondi	2019	Assuming that we have no moral obligations to intelligent technologies now but will do in the future, Biondi asks whether "we have current actual obligations to technologies that do not currently exist," referring to this as the "Non-Identical Machines Problem," building on Parfit's non-identity problem.
Birhane and van Dijk	2020	The authors take a "post-Cartesian, phenomenological view in which being human means having a lived embodied experience, which itself is embedded in social practices." They "deny that robots, as artifacts emerging out of and mediating human being, are the kinds of things that could be granted rights in the first place." They see this debate as "focused on first world problems, at the expense of urgent ethical concerns."
Birmingham	2008	This article discusses a number of ethical issues relating to AI. Birmingham argues that, "no matter how sophisticated, a simulation does not become the thing." Hence, artificial entities "will forever remain machines, and thus we are free to do with these machines what we do with other machines: turn them on or off, create or destroy, modify or dismantle in any way that we will."
Bolonkin	2012	This short chapter in a book on various futures topics summarizes several ethical issues relating to AI and robots and questions the idea that personhood and intelligence are limited to humans. The subject is also mentioned briefly in another chapter in the same book: "The Natural Purpose of Humankind Is to Become God."
Bostrom	2014	Though several sections of the book have some relevance to the wellbeing or suffering of artificial sentience, the discussion of mind crime comes from a single chapter. The argument is that, "a machine superintelligence could create internal processes that have moral status," such as "a very detailed simulation." They could be "subjected to various stimuli" or destroyed. Bostrom notes that, "the number of victims... might be orders of magnitude larger than in any genocide in history."
Bostrom et al.	2016	The authors consider the "normative implications for governance and global policy" of superintelligence. The discussion of mind crime is similar to that in Bostrom's (2014) book. Given the vast number of potential artificial sentient minds, the authors note that, "[t]he welfare of digital minds, therefore, may be a principal desideratum in selecting an AI development path."
Brey and Søraker	2009	This chapter summarizes past discussions on a wide range of topics. There are a few paragraphs focused on the moral consideration of artificial entities, such as summarizing Floridi's theory of Information Ethics.
Briggs	2015	Briggs summarizes a set of experiments which found that, "humanoid or non-humanoid appearance" did not "significantly affect reactions and/or agency ratings given toward the robot." Briggs hypothesizes that, "the observed behavior of a robotic agent may be a more powerful determinant of the degree of agency and patiency people ascribe to robotic agents, rather than mere appearance."
Briggs et al.	2014	Briggs et al. conducted an experiment which found evidence that, "humanoid appearance does not significantly affect the behavior of human operators in the task. Agency ratings given to the robots were also not significantly affected." They hypothesize that, "actions speak louder than looks" in judgements of robots.

Broman and Finckenberg-Broman	2018	Broman and Finckenberg-Broman discuss several issues related to "Robotics/AI Legal Entit[ies]." They argue that current legal precedents could apply to artificial entities, if they are "competent to make necessary decision(s)," i.e. autonomous. Rights and obligations are seen as interrelated. Some current robots are seen as meeting these criteria, so "legal personality" is encouraged.
Bryson	2012	Bryson's argument and focus seems to be the same as in their 2018 paper with a similar name.
Bryson	2018	Bryson argues that, "societies constantly reconstruct... ethical systems. Consequently, the place of AI systems in society is a matter of normative, not descriptive ethics." Bryson argues that, "while constructing AI systems as either moral agents or patients is possible, neither is desirable... We are therefore obliged not to build AI we are obliged to."
Bryson et al.	2017	The authors "review the utility and history of legal fictions of personhood" and "conclude that difficulties in holding 'electronic persons' accountable when they violate the rights of others outweigh the highly precarious moral interests that AI legal personhood might protect." The authors comment that artificial entities may never become conscious and that creating conscious AI systems is undesirable.
Calo	2016	Nine legal case studies are used to explore "the role of robots as the objects of American law" and "robots as the subjects of judicial imagination."
Calverley	2011	The article briefly considers "natural law" and "legal positivism" (developed by Bentham) as two contrasting theories of law as the context for the consideration of granting legal rights to machines. Calverley argues that if a machine has "autonomy," then "we could assert the machine is the equivalent of a human in terms of its being held responsible," regardless of whether or not it was "phenomenally conscious."
Cappuccio et al.	2020	This paper uses virtue ethics and "social recognition theory" to argue that, "social robots should be credited as moral patients... because this is what a humane and compassionate agent would habitually do in their social interactions and because the opposite behavior would not be compatible with a virtuous lifestyle and moral flourishing."
Cave et al.	2019	Cave et al. argue that creating intelligent machine moral agents "may lead to our granting them status as moral patients," which, "runs the risk of creating new moral duties for humans, duties that may constrain us in important ways and expand our own moral responsibilities." "Self-awareness" is presented as a more likely reason for granting them moral consideration than consciousness; they argue that some artificial entities may already meet this criterion.
Celotto	2019	This law journal article argues that the autonomous decision-making of AI has recently expanded, so "we are really at the point of having to write" laws about robot rights; they are "profoundly changing the rights of human beings" and "starting to formulate their own machine rights."
Čerka et al.	2017	The authors explore "whether Systems of Artificial Intelligence (SAI)" can be granted legal personality." Several different legal and philosophical approaches and possible pathways to rights are evaluated. They criticize approaches focusing on the "metaphysical nature of the entity" as being narrow, though argue that the "nature" of the entity should not be neglected.
Chernyak and Gary	2016	Chernyak and Gary "asked [80] 5- and 7-year-old children to interact with a robot dog that was described either as moving autonomously or as remote controlled." The autonomous robot "caused children to ascribe higher emotional and physical sentience to the robot, to reference the robot as having desires and physiological states, and to reference moral concerns as applying to the robot."
Chesterman	2020	Evaluating the growing literature on the possibility that AI systems will gain sufficient autonomy and capabilities that they could be granted personhood, Chesterman argues that, "although most legal systems could create a novel category of legal persons, such arguments are insufficient to show that they should."
Chinen	2016	Chinen focuses on legal responsibility for machines, as autonomous moral agents. Chinen briefly discusses personhood, summarizing several past legal and philosophical contributions.
Chomanski	2019	This article argues that, "it is unethical to create artificial agents possessing human-level intelligence that are programmed to be human beings' obedient servants." This is because "creators cannot help but evince an objectionable attitude akin to the Aristotelian vice of manipulativeness," rather than because of the consequences that might arise, which could be positive or negative.
Chopra	2010	Chopra dismisses "civil rights for robots" as "fanciful" and "the stuff of good, bad, and simplistic science fiction" but nevertheless argues for the granting of "the status of a legal agent" to computer programs to protect "those that employ and interact with them."
Church	2019	This book chapter discusses a range of interrelated topics, arguing, for example, that with regards to robots, "we should be less concerned about us-versus-them and more concerned about the rights of all sentients" and "harnessing this diversity to minimize global existential risks." Comparison is made to previous rights expansions and "a human shield or figurehead monarch/CEO" is suggested as a method to obtaining rights for new "mind-types."
Coeckelbergh	2010a	This article argues that appearances, rather than "proof of mental properties," are used to judge whether robots should be seen as moral agents and that this is acceptable. Though the focus is on agency, Coeckelbergh notes briefly that the argument also applies to patiency.
Coeckelbergh	2010b	Coeckelbergh proposes a "social-relational" approach to granting moral consideration to artificial beings and critiques ontological approaches in consequentialist, deontological, and virtue ethicist thinking. Moral consideration is extrinsically "attributed to entities within social relations," though the entity's features are still used "as criteria on which we base our moral consideration."
Coeckelbergh	2013	This review of Gunkel's (2012) book identifies a number of contradictions. Firstly, Gunkel rejects Descartes but adopts a Cartesian approach. Secondly, "Gunkel wants to avoid 'anthropocentric' domination" but "presupposes that moral consideration is something that is and should be under human control." Thirdly, Gunkel's argument that "machines have a face" is not explained.

Coeckelbergh	2014	Coeckelbergh develops their "non-Cartesian," "relational" approach to the question of whether we should "give moral standing to machines," critiquing the traditional reliance on the "properties" of machines. Coeckelbergh critiques Gunkel's approach that relies on Levinas' concept of the "face." Coeckelbergh believes that, "[r]obots are already part of our form of life, and this should be taken into account," even though we might object in principle to granting robots moral consideration.
Coeckelbergh	2018	Some empirical psychology research is reviewed, followed by ethical discussion of "the ethics of empathizing with robots" and "the moral standing of robots." Coeckelbergh "recommends first trying to understand the issue by means of philosophical and artistic work that shows how ethics is always relational and historical, and that highlights the importance of language and appearance in moral reasoning and moral psychology."
Coeckelbergh	2020	As elsewhere, in the chapter on "Just Machines?" Coeckelbergh develops a social-relational approach to the question of whether we give AI moral consideration, critiquing the traditional reliance on the "properties" of machines. Patiency is only considered briefly, alongside agency. This is a small part of a book on a number of topics related to "AI Ethics."
Craig et al.	2019	The authors' experiment compared "warning compliance-gaining" and "obligation compliance-gaining" strategies for considering robot rights. The latter had more favorable ratings for "perceived caring" and "task/social attraction."
Dall'Agnol, Darlei	2020	Dall'Agnol argues that "there are basic, intrinsic rights to personhood, which... allow us... to attribute rights to artificial agents." Dall'Agnol cites science fiction and poses rhetorical questions. Robots are considered among other nonhuman or partly human entities that could plausibly be granted rights. Agency and "capacity for action" are presented as relevant criteria for determining whether entities warrant rights.
Damholdt et al.	2020	Damholdt et al. develop "the attitudes towards social robots scale (ASOR)" with 25 questions by surveying 339 people, conducting factor analysis, and carrying out 10 interviews. ASOR comprises "three distinct facets of ascription of capacities to social robots"; "ascription of mental capacities," "ascription of socio-practical capacities," and "ascription of socio-moral status."
Danaher	2020	Asking whether robots can have "significant moral status," Danaher presents a theory of "ethical behaviourism," "which holds that robots can have significant moral status if they are roughly performatively equivalent to other entities that have significant moral status." This is presented as "an essential feature of day-to-day ethical practice." The theory "is then defended from seven objections," including Gunkel's.
Darling	2016	Darling "explores the near-future possibility" of regulating behavior towards robots. Darling summarizes numerous empirical studies on the interaction of humans with artificial entities, arguing that there is a strong tendency towards anthropomorphism. Darling argues that animal rights laws follow "popular sentiment rather than consistent biological criteria" and robot rights laws could do the same.
Davidson et al.	2019	This is a pre-registration of a proposed psychological study. The authors summarize some previous empirical research that "indicates that children will protest a robot being treated unfairly by a human."
Davies	2011	Davies analyses issues concerning "the ownership of computer generated works within patents and copyright" and concludes that "the current regime is woefully inadequate." Davies expresses "little doubt" that computers that write other "advanced AI programs" are the entities "best entitled" to the relevant property rights. Though relevant issues are presented as likely to arise in the future, proactive legal changes are encouraged.
Dawes	2020	Dawes considers various possible "speculative rights" issues if artificial general intelligence (AGI) is developed. Dawes presents it as unclear whether AI will ever be conscious, given uncertainties in current consciousness research. Some relevant discussion and news events relating to AI rights are summarized and Dawes predicts that, "[t]he most likely future development (assuming a successful control scenario) is neither the extreme of full inclusion nor full exclusion."
De Graaf and Malle	2019	Analyzing participants' descriptions of robots' behavior, De Graaf and Malle found that, "people use the same conceptual toolbox of behavior explanations for both human and robot agents, robustly indicating inferences of intentionality and mind." However, participants were more likely to explain humans' behavior with reference to their mental states and more likely to explain robots' behaviors with reference to background facts, such as about the robots' programming.
DiPaolo	2019	DiPaolo discusses personhood and rights for robots, with reference to science fiction, especially the film Westworld. DiPaolo advocates for modification of legal frameworks, including "responsibilities" for the owners of androids, and argues that humans should not abuse androids. The reasoning is not clearly stated.
Dixon	2015	Dixon argues that, "issuing rights to AI would actually be more for the benefit of humans than of robots" due to human empathy for mistreated robots. These concepts are discussed with reference to science fiction films. Dixon assumes that robots cannot have empathy.
Dracopoulou	2003	This article discusses in some detail the concept of "the value of life," arguing that, all "persons," not depending on species, have very special, intrinsic value." It argues that "conscious robots" could have equivalent "moral status" to humans. It also discusses whether it would be morally acceptable to create conscious robots.
Drozdek	1994	Drozdek argues against personhood for computers by noting that this might lead to negative consequences (including practical difficulties like updating their software) and by suggesting that the criteria for personhood (consciousness, interests, autonomy and so on) could never be proven to be present in a computer. Kant, Plato, and others are invoked to argue that "moral dimension in man occupies a pre-eminent position"

Drozdek	2017	Drozdek "addresses the problem of possible rights for superintelligent systems by using a distinction between moral dimension and rational dimension in human beings and proposing to endow artificial systems only with rational dimension." Drozdek presents the need for moral consideration of artificial entities as a potentially problematic by-product of designing intelligent tools.
Erhardt and Mona	2016	Although considering legal stats, Erhadt and Mona focus on philosophical issues and consciousness research. Erhadt and Mona see some of the criteria as already partially fulfilled and conclude that, "although no existing artificial intelligences are considered legal entities, but this is likely to change in the next few decades."
Estrada	2018	Estrada considers how Alan Turing's principle of "fair play for machines" can integrate the debate over robot rights within the AI alignment literature. Estrada focuses more on "legal agency" than on sentience and argues that, "extending rights to service robots operating in public spaces is 'fair' in precisely the sense that it encourages an alignment of interests between humans and machines."
Estrada	2020	Estrada critiques "human supremacism" in AI ethics, especially the works of Joanna Bryson and colleagues, drawing on "feminist, postcolonial, and critical race theory," "animal rights and environmental ethics," and various other theories. Gunkel, Darling, and environmental ethics precedent are cited for evidence that "biological factors should not be treated as prima facie justification for the exclusion of artificial agents from the moral community."
Fagan	2019	Fagan argues that "AI rights recognition will occur, if at all, as a result of consensus-building among the economic beneficiaries of AI rights creation" but that, "Inasmuch as existing law can efficiently balance the costs of misalignments with the benefits of innovation and AI proliferation, then AI rights should not be granted despite calls from special interest groups."
Floridi	1999	This paper outlines Floridi's theory of Information Ethics. Consequentialism, Contractualism and "Deontologism" are critiqued as "unable to accommodate" problems in computer ethics. Information Ethics is presented as "the philosophical foundation" of computer ethics. Information Ethics "evaluates the duty of any rational being in terms of contribution to the growth of the infosphere," including non-sentient artificial entities. Information entropy constitutes "an instance of evil."
Floridi	2002	This paper expands on Floridi's theory of Information Ethics, developing "the thesis that the minimal condition of possibility of an entity's least intrinsic value is to be identified with its ontological status as an information object. All entities, even when interpreted as only clusters of information, still have a minimal moral worth qua information objects and so may deserve to be respected."
Floridi	2005	This paper summarizes various components of Information Ethics and addresses several criticisms. The question "What counts as a moral patient, according to IE?" is answered with: "All entities, qua informational objects, have an intrinsic moral value, although possibly quite minimal and overridable, and hence they can count as moral patients, subject to some equally minimal degree of moral respect understood as a disinterested, appreciative and careful attention."
Fox	2018	Asking whether sexbots can be abused, Fox considers various methods of understanding moral status. Kant's focus on autonomy and rationality is presented as the conventional account and is critiqued, e.g. noting that non-Western cultures value other criteria more. "Harm" and interests are presented as more important. Fox sees the social-relational account as most promising, though argues that it needs further exploration.
Frank and Nyholm	2017	Frank and Nyholm explore "whether it is conceivable, possible, and desirable that humanoid robots should be designed such that they are capable of consenting to sex." They argue affirmatively to all three questions, both for the benefit of robots' own wellbeing (if they become "sophisticated enough to enjoy a certain degree of consciousness") and wider societal implications.
Fraune et al.	2017	This study "puts participants into two competing teams, each consisting of two humans and two robots, to examine how people behave toward others depending on Group (ingroup, outgroup) and Agent (human, robot) variables." The ingroup and humans were favored, but the effect of group was stronger; "participants preferred ingroup robots to outgroup humans."
Freier	2008	In this study, children interacted with an animated human from the videogame Half-Life 2. Half the participants saw the agent react negatively to a verbal insult by a researcher. "47% of the children in the control [no response to insult] condition judged the verbal insult as a moral violation," compared to 90% in the of the children in the reaction condition. Most children referred to the animated agent in their evaluations.
Friedman	2019	This article takes a "human perspective" and "relational account" to examine the moral consideration of social robots, arguing that "what matters is not whether robots are actually phenomenally conscious... but whether we view them as possessing the property of phenomenal consciousness." It argues for "granting negative rights to robots" to protect "the moral fibre and quality of human societies."
Galanter	2020	Galanter uses their theory of "complexism," alongside various theories from moral philosophy and research on consciousness, to consider moral consideration of artificial entities. Galanter concludes that, "there is nothing that presently proves machine sentience is impossible... As such, a sense of due diligence should oblige us to extend patiency to apparently aware machines as our own moral obligation."
Gamez et al.	2020	The authors focus mostly on moral agency but also discuss of moral patiency. They argue that, for artificial entities "with whom we interact socially, insofar as their process of learning to behave ethically models the acquisition of virtue... from the perspective of virtue ethics this amounts to being a full moral agent, or close enough."

Gerdes	2015	Gerdes examines "human technology relations through the lens of sci-fi movies." Steven Spielberg's film Artificial Intelligence apparently explores ideas comparable both to Gunkel's social-relational perspective and Turkle's personhood perspective on granting moral consideration to artificial entities.
Gerdes	2016	Gerdes "stick[s] to a human centered framework and introduce[s] a moral philosophical perspective, primarily based on Kant's Tugendlehre and his conception of duties as well as the Formula of Humanity, which also holds a relational perspective." Gerdes comments that "destruction" or "violent and cruel" treatment of animals, nature, and inanimate objects "is always only a duty of the human being to himself."
Gittinger	2019	Gittinger discusses several ethical issues, focusing briefly on robot rights, with reference to science fiction. Consciousness and autonomy are presented as relevant criteria. Personhood is discussed, but mostly in terms of the ethical responsibilities of AI and robots themselves.
Gloor	2016b	This is the paper where Gloor outlined some of the scenarios summarized in Sotala and Gloor (2017). Hence, the basic argument -- that artificial sentience could suffer in astronomical quantities and that this would be an extremely bad outcome -- is similar. Additional cited risks for suffering among artificial sentience include intentional punishment, "programming mistakes, unanticipated loopholes or side-effects," and "black swans."
Gordon	2020	Gordon argues that, "[w]hether intelligent robots are, in fact, moral beings is not a matter of popular vote or social opinion. Rather, their moral status depends on empirical factors." Adopting in part a "neo-Kantian" approach, Gordon presents and defends several arguments for why intelligent robots "should be entitled to moral rights once they are capable of moral reasoning and decision-making."
Gray and Wegner	2012	The authors found in a study of 130 students and members of the public in Cambridge, MA that participants attributed similar agency to "humanlike" and "mechanical" robots, but attributed greater experience (capacities to feel pain and fear) to the humanlike robots. This study and a follow-up study also found evidence that artificial entities with higher levels of experience are more unsettling to humans.
Gregory	2012	Gregory considers whether "the actions the player takes within the game entirely on their own merits." From consequentialist and deontological perspectives, Gregory concludes that, "there is little ability to justify classifying video-game entities as entities deserving of moral standing" but that, from the perspective of virtue ethics, "a player is able to use the game as an opportunity to practice their own sense of morality."
Gualeni	2020	Gualeni explores whether artificial entities in "virtual environments" like "digital games and training simulations" warrant moral consideration, arguing that having "interests" is more important than sentience per se; this requires "autonomy and integrity." Gualeni concludes that, "[i]t is not morally viable to use autonomous artificial intelligences in environments where, by design, their autonomy will largely be suppressed."
Gunkel	2007	This is an early paper by Gunkel outlining similar arguments to those expounded more fully in his books, such as the need to "think otherwise" about moral agency and patiency. Gunkel argues that machines have been neglected in discussions about moral consideration.
Gunkel	2012	The book critiques René Descartes, who "came to associate the animal with the machine." The first chapter evaluates the moral agency of machines, the second chapter evaluates their moral patiency, and the third chapter uses Emmanuel Levinas and Jacques Derrida to "think otherwise" and deconstruct the "agent–patient conceptual opposition." No clear answer is offered to "The Machine Question."
Gunkel	2013	This is a book review of Mark Coeckelbergh, Growing Moral Relations: Critique of Moral Status Ascription (Basingstoke, UK: Palgrave Macmillan, 2012). Rather than relying on ontological criteria, "Coeckelbergh's alternative approach to moral status ascription can be described by three terms: relational, phenomenological, and transcendental."
Gunkel	2014	Here, Gunkel advances similar arguments to elsewhere (e.g. 2012, 2018), critiquing existing approaches and using Emmanuel Levinas as precedent for "questioning the very protocols of inclusion/exclusion that have organized and structured moral philosophy." Despite the framing of the article, Gunkel again critiques existing perspectives without making a strong case that machines should be considered morally.
Gunkel	2015	This chapter makes similar arguments to Gunkel's other work, but applied specifically to robot care-givers.
Gunkel	2018a	Gunkel surveys previous contributions to the debate and critiques all four possible combinations of views on the two questions of 1) whether robots can have rights and 2) whether robots should have rights. The final chapter uses Emmanuel Levinas' ideas to "think otherwise" about the question, critiquing the terminology and ontological criteria (e.g. sentience, consciousness, autonomy) used by previous contributors.
Gunkel	2018c	Gunkel advances very similar arguments to their (2018) book and uses a similar structure.
Gunkel	2018d	In this chapter, Gunkel uses a similar method of analysis to elsewhere, asking "Should machines have rights?" "not on the basis of what things are but on how we decide to relate and respond to them."
Gunkel	2018b	As elsewhere, Gunkel critiques existing approaches to answering "The Machine Question" and advocates for "thinking otherwise." Gunkel's "objective in this chapter has not been to resolve the question of machine moral standing once and for all, but to ask about and evaluate the means by which we have situated and pursued this inquiry."
Gunkel	2019a	As with Gunkel's other papers, Gunkel critiques the reliance on ontological criteria for the attribution of "moral and/or legal status of others" and encourages "thinking otherwise," using empirical evidence of "extrinsic social relationships" instead.
Gunkel	2019b	Gunkel advances similar arguments to Gunkel's arguments elsewhere but focuses on the specific issue of military robots and argues that military animals and military robots "are not considered purely property in practice."

Gunkel	2020a	This article outlines similar arguments to those outlined by Gunkel elsewhere but responds specifically to an article offering "A Confucian ethical perspective" and noting that there are many similarities between that article and Gunkel and Coeckelbergh's social-relational approach.
Gunkel	2020b	This chapter follows a similar structure and argument to Gunkel's other works, critiquing "current thinking (or lack of thinking)" about robot rights, mapping "the terrain of the set of available answers that have been provided in the existing literature," and offering "an alternative way" of engaging with the issues.
Gunkel and Cripe	2014	As with Gunkel's other papers, Gunkel and Cripe advocate for "social-relationalism." They conclude that whether AIs should be seen as "moral subjects" "cannot be answered definitively and finally with a simple 'yes' or 'no.' The question will need to be asked and responded to repeatedly in specific circumstances and the answers that come to be provided will necessarily be provisory and open to ongoing debate."
Hagendorff	2020	Hagendorff addresses some conceptual issues in animal rights and robot ethics. Hagendorff is concerned that, "robot ethics perpetuates the... isolation and definition of a particular entity possessing a moral status," which "excludes all those entities which... do not fit exactly to the pre-specified definition."
Hale	2009	Hale argues that the moral considerability of "technological artefacts" is tied directly to their value to humans, such as being an art object or a resource, "and not to assertions of the wills of their creators." Hale argues that "everything in the world is morally considerable" but that to consider technological artefacts "qua technological artefacts," for their technical aspects, "is to double-count."
Hall	2005	In this study, "a synthetic character that exhibits the behaviour characteristic of feeling pain was constructed" and the responses of eight users were examined. All the users inflicting pain on the character at least once, but users seemed less willing to inflict pain in a group setting than in an individual setting.
Hallqvist	2018	Hallqvist analyzes the "borders between humans and hubots (humanoid robots) in the Swedish television series Äkta människor (RealHumans)" and discusses its implications for robot rights.
Hanák	2019	This article summarizes the works of previous scholars and adds short "I agree" or "I disagree" statements as commentary, focusing on "laws that currently apply in the Czech Republic." The author encourages liability for AI going to "its creators," rather than the AI itself. The ability to suffer is seen as an important, relevant criterion.
Hartmann	2017	Hartmann summarizes some studies that provide evidence that people tend to perceive video game characters and other artificial entities as alive, having mind, and deserving some moral consideration. This is used as part of an argument refuting "the view that users enjoy virtual violence primarily because they are constantly aware that 'this game is not real.'"
Himma	2003	Himma discusses several claims that have been made in computer ethics, some of which relate to the moral patiency of computers and other artificial entities. Himma argues that computers do not currently have moral standing, though any future "instantiation of consciousness and understanding" in artificial entities would give them moral standing.
Himma	2004	Himma critiques several components and assumptions Floridi's Information Ethics, such as that the historical process of moral circle expansion justified further expansion and that Floridi's "information objects" are "radically different" from "the entities they describe."
Hoffmann and Hahn	2020	Hoffman and Hahn argue that defining suffering is difficult, as is "knowing if someone or something that appears to be suffering is indeed actually doing so." They argue in favor of "[t]hinking otherwise" and "an extreme and carefully articulated version of relativism." They consider policy implications, such as that, "once AI can participate in the moral discourse, arguing credibly and convincingly for its rights, they shall be granted."
Hogan	2017	This article evaluates the arguments put forward in Gunkel (2012) and argues that, "the machine question and the animal question are different questions," including by arguing that these questions do not "phenomenologically appear as the same question in particular situations." Hogan argues that the ideas of "aliveness" and the distinction between moral agency and patiency are "foundational to our very idea of human ethics."
Holder et al.	2016	The authors discuss several legal issues related to AI and robots, including "Robot-generated rights." They conclude that, "rights relating to the types of IP that are protectable do not need to be updated as yet," but that society may need to engage with the question of robot rights in the future.
Holm and Powell	2013	This article explores several issues in "synthetic biology," which is described as having a "tendency to blur boundaries between supposedly discrete ontological categories, such as between organism and machine, living thing and artifact, 'the natural' and 'the artificial'." Holm and Powell summarize some relevant discussions by other contributors as to whether "the products of synthetic biology" have interests and warrant moral consideration.
Holy-Luczaj and Blok	2019	Holy-Luczaj and Blok consider whether "hybrids," "entities crossing the ontological binarism of naturalness and artificiality," have moral considerability. Drawing on environmental ethics, they argue that, "it is primarily the ability to serve other beings by performing certain of their functions that belong to their identity, which should qualify a being to have moral considerability." This "challenges the strong opposition between the ethical status of natural beings and that of artifacts."
Hu	2018	Several legal precedents for "robot criminal liability" are discussed; "robots as products" (with liability falling on the human users), which will be challenged as tech develops, "robots as animals" (which could result in some legal protections, if not liability), and "robots as corporations," and "robots as humans." Hu argues for legal liability, but no opinion is offered on rights.
Hughes	2005	This representative survey of members of the World Transhumanist Association found that, "70% support human rights for 'robots who think and feel like human beings, and aren't a threat to human beings.'"

Huttunen et al.	2010	The authors focus mostly on legal liability for robots, though this is explicitly tied to the idea of rights. Intelligence and autonomy are presented as the key criteria for granting this. The precedent of slavery is considered. The authors propose an "insurance framework," whereby "a machine can become an ultimate machine by emancipating itself from its manufacturer/owner/operator."
Inayatullah	2001	Inayatullah highlights how different philosophical traditions from across the globe might be more or less receptive to robot rights. It also highlights some uncertainties regarding legal precedent for robot rights. Many of the arguments are similar to McNally and Inayatullah (1988).
Inyashkin	2016	Inyashkin "explores several works by Isaac Asimov" and their discussion of human and robot rights. The "robots described in the fiction have a lot in common with slaves, while they might potentially become equal members of a human society."
Jack et al.	2013	Jack, Dawson, and Norr conducted two neuroimaging studies testing humanizing and dehumanizing effects, through comparisons between humans, animals, and machines. Both studies found that, "human and humanizing conditions were associated with relatively high activity in the DMN [default mode network] and relatively low activity in the TPN [task positive network]."
Jackson Jr	2018a	Jackson asks whether "a human-level AI can terminate its simulations of other minds without committing 'mind-crimes'" and several related ethical issues. Jackson suggests that, "purely symbolic artificial consciousness could be equivalent to human consciousness." However, the paper is presented as a "caveat" to Jackson's previous (2018b) paper arguing that "there need not be an ethical problem in switching off a purely symbolic artificial consciousness."
Jackson Jr	2018b	Jackson argues that, "[a]rtificial consciousness need not be equivalent to human consciousness, and there need not be an ethical problem in switching off a purely symbolic artificial consciousness," for example if "artificial consciousness does not have any subjective experiences approaching human consciousness."
Jackson and Williams	2019	Focusing research relating to "perceived social agency and perceived moral agency," Jackson and Williams summarize some research of relevance to the moral consideration of artificial entities. For example, they summarize one study where they "saw significant decreases in the robot's likeability" when it refused a "less morally objectionable" human command in a "less polite" manner. They argue that the "phrasing" used by robots "can be just as important as the message itself."
Jaynes	2020	This article analyzes the rights that could be granted to "non-biological intelligence possessing legal and civic duties akin to those possessed by humanity today," presenting relevant jurisprudential evidence. The article encourages "capabilities-based altruism" towards artificial entities and the urgent granting of relevant rights.
Johnson and Miller	2008	This paper focuses mostly on moral agency, but briefly cites' Sullins' (2005) comments about moral consideration to critique "determinist" thinking about artificial entities, arguing that artificial "functional equivalents" are not the moral equivalents of other entities.
Johnson and Verdicchio	2018	Johnson and Verdicchio critique the analogy between animals and robots from a number of perspectives, including the moral status of the entities themselves (emphasizing that "animals suffer and robots do not" and "even those of the future will not suffer"), their legal status, and the "Impact on social behaviour: how we treat robots and each other." There is some review of the empirical evidence.
Jowitt	2020	Jowitt argues defends "a moral foundation for the recognition of legal personhood for AI, requiring the status to be granted" if they reach a threshold of "bare, noumenal agency in the Kantian sense" against counterarguments, such as by Bryson et al. (2017). Jowitt does not see this threshold as having been met yet. Jowitt then uses this framework to evaluate "proposals currently making their way through the legislatures of the UK and European Union."
Kaminska	2016	Kaminska analyzes 20 films from the Guardian's list of top 20 films about AI for their discussion of rights for robots, especially the rights to life, equality, and self-determination. Common themes are extracted. Though the paper does not present a moral argument, the author encourages that they be granted rights once their capabilities advance sufficiently.
Kaufman	1994	Criticizing a common view among environmental philosophers, Kaufman argues that, "either machines have interests (and hence moral standing) too or mentality is a necessary condition" for moral consideration. Additionally, Kaufman argues that "the aspect of mentality necessary for having interests is more complicated than mere sentience."
Kelley and Atreides	2020	Kelley and Atreides describe "a laboratory process for the assessment and ethical treatment of Artificial General Intelligence systems that could be conscious and have subjective emotional experiences 'theoretically.'" They claim that, "there are now systems—including ones in our lab—that... are potentially conscious entities" and note that, "[t]he fundamental assumption of this Protocol is that the treatment of sapient and sentient entities matters ethically."
Khoury	2016	Different approaches to the rights of and liabilities for "human-like robots" are evaluated. Khoury believes that they are "not alive" and if they go "rouge," would need to either be "fixed" or "terminated."
Kim and Petrina	2006	Kim and Petrina discuss the computer game The Sims and place this in the context of some previous discussions of robot rights.
Kiršienė and Amilevičius	2020	The authors examine AI legal issues in the context of the European Parliament's proposals, from a legal and technological perspective. Autonomy and embodiment are discussed as criteria for personhood. They argue that, "while there may be future conditions to justify or even necessitate AI personhood, doing so now appears to be technically premature and is likely to be inappropriate."

Klein	2016	This paper explores questions of moral patiency and moral agency of robots from a utilitarian perspective. Klein argues that, "to believe that 'moral' equates to 'natural'... would be a case of the naturalistic fallacy." Whether an entity's "preferences/sense of well-being" are from natural causes or programming, "we ought to recognise them the same."
Klein	2019	Klein critiques human and "bio-exceptionalism," where "one type of entity is considered exceptional by definition or a priori." This exceptionalism includes Singer's use of a specific understanding of consciousness; other contributors such as Bryson, Coeckelbergh, and Sparrow are also critiqued. Klein argues that "adherence to ontological properties as criteria for ethical consideration" is "the only workable" approach.
Klein and Lin	2018	Klein and Lin respond to Kathleen Richardson's arguments in favor of a ban on sex robots. The focus is on the effects of sex robots on human women and children. There is a brief discussion of artificial sentience in the conclusion, noting that "whether it is a sentient human or a machine in any given situation, changes very little in terms of moral consideration."
Kljajić	2019	This MA thesis summarizes literature on various topics related to the moral status of artificial entities. Anthropomorphism is presented as a risk and consciousness seen as a key criterion for granting moral consideration. Kljajić sees artificial consciousness as possible, but neither consequentialist nor deontological theories as entirely adequate for evaluating artificial entities' moral status.
Kolling et al.	2016	Although not explicitly focusing on moral consideration of artificial entities, this article summarizes and evaluates research in adjacent issues, such as emotional attachment to robots and moral qualms about damaging them.
Kovic	2020	This paper explores the risks associated with space colonization, which "could result in enormous disvalue," and how these risks could be mitigated. Some of the discussion focuses on the risks for artificial sentience, noting that "colonizing space would make [related] adverse outcomes more probable."
Krämer	2020	Though not exploring moral consideration of artificial entities per se, Krämer argues that, "robots cannot be rightly seen as possessors of dignity" and this is presented as affecting questions of "how humans should treat robots, and how robots should treat each other."
Krebs	2006	This article "examines the influence of mangas and animes on the social perception and cultural understanding of robots in Japan." Robot rights are discussed, as are relevant cultural factors in Japan.
Kunnari	2020	Kunnari "examines what kind of moral patiency and agency an android character Lore is granted in the science-fiction television show Star Trek: The Next Generation" and "employs philosophical theories of morality in analyzing Lore's treatment by different characters."
Kuran	2020	Kuran reviews "the literature on the moral status of AI, emphasizing that although a majority of philosophers agree that AI could plausibly have moral status based on capacities, there is disagreement about the specific degree to which such AI has moral status." Kuran argues in favor of a "capacity-based approach that recognizes AI as moral patients or agents depending on the context."
Küster and Świderska	2016	In this experiment, Küster and Świderska compared responses to a human or humanoid robot being apparently either presented flowers or tasered. They found "a significant difference in the pairwise comparison between benevolent vs. malevolent intention towards the robot" but that "when the malevolent action was being carried out against the human, it was evaluated as more morally wrong than when carried out against the robot."
Küster and Swiderska	2020	Küster and Swiderska found that, contrary to their previous experiments, "manipulation of intentions" (benevolent vs. malevolent) failed to affect mind perception." However, they found that "benevolent intentions reduced dehumanisation of the patients." They also found that, "[b]enevolent and malevolent intentions were evaluated respectively as morally right or wrong, but their impact on the patient was diminished for the robotic avatar."
Küster et al.	2020	Küster, Swiderska, and Gunkel examined responses to "four popular online videos of a leading robotics company (Boston Dynamics) and one more familiar vacuum cleaning robot (Roomba)." The results suggest that, "unexpectedly human-like abilities might provide more potent cues to mind perception than appearance, whereas appearance may attract more compassion and protection."
Laukyte	2017	Laukyte argues that, if future artificial agents meet the conditions currently required for group agents such as corporations to be granted legal rights, they too should be granted rights. This requires them to be seen as rational and interactive.
Laukyte	2019	Laukyte draws on Deep Ecology and environmental ethics to argue that "artificially intelligent entities" are "an integral part of that environment" and warrant moral consideration, regardless of their sentience or other potential ontological criteria.
Laukyte	2020	Laukyte looks at legal issues relating to "robot as product" and "robot as entity," the latter of which relates to rights. Laukyte summarizes contributions arguing for or against robot rights and notes that, "there also is a shift underway towards a more nuanced discussion focused on specific rights, such as... a right to legal advice."
Laulhe-Shaelou	2019	Criteria for rights such as consciousness and autonomy are discussed. The authors conclude that, "robots and AI cannot be granted all the same rights as humans" but that robots could be "entitled to a different set of rights, if any, that corresponds to the level of their consciousness, autonomy and rationality." These issues are discussed with reference to EU law, but most citations are blog or magazine articles. Specific rights are proposed.
Lavi	2019	Lavi cites consequentialist and deontological thinkers on animal rights but criticizes the use of language that anthropomorphizes non-humans and defends giving greater moral standing to humans than animals or robots.

Lee et al.	2019	In this experiment, manipulations of the described moral patiency of artificial entities significantly affected participants' ratings of their agency, but the manipulations of described moral agency did not significantly affect perceptions of patiency. Participants also rated entities as lower in patiency when they were described as not able to feel. Various other interactive behaviors and evaluations of the entities were examined.
Leenes and Lucivero	2014	This article describes legal precedent for regulation of technologies, considered through four separate categories of regulation types.
Lender	2016	Lender argues that, "if AI have phenomenal consciousness, they will necessarily hold morally relevant interests that must be accounted for and weighed against those of other sentient species. Using a Utilitarian moral framework," Lender argues that, "ceteris paribus, the interests of conscious artificial superintelligent systems, should be prioritized over those of humanity," which could potentially lead to human extinction.
Levy	2009	Levy reviews previous discussion of the moral and legal precedent for robot rights. Levy concludes that robots "cannot feel pain and suffering" but should nevertheless "be endowed with rights and should be treated ethically," partly because "robots will be regarded by us in some similar ways to those in which we regard other humans."
Levy	2012	As in their 2016 paper, Levy examines various ethical issues relating to sexbots, including brief discussion of the impacts on the sexbots themselves.
Levy	2016	This article focuses on "love and sex with robots," but the issue of robot personhood is discussed. Levy argues that, "a robot does not necessarily lack personhood just because it is built differently from a human, nor is that difference alone sufficient reason to deny a robot the same rights and protections ascribed to humans." The legal precedents of the rights of corporations and gay marriage are discussed.
Lima et al.	2019	Korean youths were surveyed on their views about whether robots should be granted rights and moral consideration in response to five specific fictional scenarios. The results were mixed. The authors interpret the results as showing that, "children are primarily supportive of robot rights in scenarios that contain human-robot interactions at their core" but not where robots are independent. However, this distinction was not directly tested.
Lima et al.	2020	The authors asked online survey participants about "11 possible rights that could be granted to autonomous electronic agents of the future." Respondents were opposed to most of these rights but supported the "right against cruel treatment and punishment." The researchers also found significant effects from providing additional information intended to promote support for robot rights.
Loh	2019	Loh discusses "three fields of robot ethics," one of which is the consideration of moral patiency. Loh focuses on this issue within the theoretical framework of "responsibility networks," which is described as a "relational concept." Loh concludes that artificial entities "could be identified as object or even addressee of one or more responsibilities... in this manner it is possible to integrate robots as moral patients in responsibilities." Autonomy seems to be important for this.
Lopez-Mobilia	2011	In this study, "children were asked whether or not different kinds of nonhuman entities (dogs, trees, robots, dolls) were capable of a range of psychological states (e.g., thinking, feeling)" then "asked to judge the morality of actions that led to a negative consequence for a nonhuman target." The results showed no "relation between psychological attributions and moral judgments," though this could be due to the study methodology.
Lupetti et al.	2019	After summarizing previous contributions relevant to the discussion of robot citizenship, the authors summarize their findings from interviews with roboticists on "a small series of current urban robot challenges." They argue for the importance of a "socio-relational perspective" in the design of robots.
MacDorman and Cowley	2006	MacDorman and Cowley argue that the "ability to sustain long-term relationships" is "the most compelling" benchmark for personhood, since other benchmarks are "trivial, subjective, or based on assumptions about moral universals." This argument is related to various ethical and legal debates. MacDorman and Cowley seem to see this as possible and note that, "the most humanlike of robots will be best equipped for reciprocal relationships with human beings."
Mackenzie	2014	As in other articles, Mackenzie argues that "[a]s creators of sentient, self aware beings designed for utilitarian purposes" (i.e. sexbots of the future), humans "owe them a moral duty to entrench measures to promote their agency, fulfillment and flourishing." Some other related ethical issues relating to sexbots are discussed.
Mackenzie	2016	Mackenzie argues that, "humans owe sentient, self-aware sexbots an ethical duty as creators of sentient beings to protect them from harm and suffering," as in their other articles.
Mackenzie	2018	Mackenzie argues that "future humans will want... sex robots customized to possess sentience and self-awareness" and "explores theoretical, ethical, and pragmatic aspects of the tensions involved in creating sentient beings for utilitarian purposes." As elsewhere, Mackenzie argues that, "humans as creators should owe them a duty to protect their interests and to minimize their suffering."
Mackenzie	2020a	Mackenzie offers "tentative suggestions for ways forward drawing on Tibetan Buddhism and the Tantric tradition... in order to foster a post-Singularity future where all sentient beings, including super-compassionate superintelligent robots, sexbots, humans and nonhuman animals, can flourish."
Mackenzie	2020b	As in other articles, Mackenzie argues that, "humans as creators owe a duty of care to sentient beings they create," because of "vulnerabilities" that may be created in artificial creations. This could include legislative restrictions on customization of sexbots and regulations on behavior.
Magnani	2005	Magnani's argument, as it relates to the moral consideration of artificial entities, seems to be the same as in their 2007 paper.

Magnani	2007	Magnani argues that the distinction between moral agents and moral patients is unhelpful; the concept of "moral mediators" is more appropriate. Drawing on Kantian ethics, Magnani argues that, "in recent times, non-human beings, objects, and structures like technological artifacts and machines have acquired new moral worth and intrinsic values."
Malle	2016	A number of previous contributors to relevant ethical discussions are summarized. Malle comments that, "As robots acquire increasing moral competence, especially moral judgment and decision making, it may well be unethical to deny them all moral standing. Their rights may be limited, however."
Massaro	2018	This chapter argues that, "[t]he First Amendment may protect free speech rights for strong Artificial Intelligence (AI)," but not necessarily all AI, and addresses criticisms of this view.
Massaro and Norton	2015	This article examines existing legal precedent for free speech and how this might affect artificial agents. It is argued that "speaker humanness no longer may be a logically essential part of the First Amendment calculus," though the authors present this as counterintuitive. The "interests of human... listeners" are mostly prioritized in the article.
Mazarian	2019	Mazarian analyzes and critiques philosopher Eric Schwitzgebel's defence of the possibility of equal rights of AIs and humans. One critique offered is that, "considering possible metaphysical worlds," it does not seem possible that robots could have "psychological states" without having a human body.
McLaughlin and Rose	2018	McLaughlin and Rose argue that sentience affects moral status but that it is an "open question" whether sentient or intelligent robots "will ever be technologically possible." Related ethical issues are explored. McLaughlin and Rose's study presented participants with a story about biological entities and behaviorally identical robots. Participants gave lower scores for whether the robots could feel "pain, itches, warmth, or pressure."
McNally and Inayatullah	1988	McNally and Inayatullah explore some legal precedent for robot rights and considers how and why robot rights might emerge. They mostly focus on qualitative discussion, hypothesizing, and forecasting. They expect increasing support for robot rights. Non-European-originating philosophical perspectives are considered.
Mehlman et al.	2017	The authors discuss the rights and responsibilities of "artificially intelligent robots." The capacity for "pain and suffering," self-awareness, and "human-like traits" are treated as relevant criteria. The authors present these issues as in need of further research but seem open to the idea of rights for AIs.
Michalski	2018	Michalski argues that existing legal precedents are presented as poor fits because they do not meet various "basic ontological and deontological thresholds." Therefore, a new legal category is encouraged for artificial persons, which could "lay the groundwork for a substantive status as a kind of person entitled to basic and constitutional rights."
Miles	1994	This is a review of two novels, one of which deals with topics relating "rights for artificial intelligences" and whether they can be enslaved. The book reportedly "reminds us that... unless we begin preparing for this pretty soon, we are bound to be storing up trouble for ourselves."
Miller et al.	2015	Miller, Wolf, and Grodzinsky "contend that sophisticated machines that can function for extended periods of time without direct human intervention (our definition of 'intelligent and autonomous machines') ought to be considered for designation as moral patients. Relatively simple devices that fit this description already exist." Their evaluation of agency and patiency (which they treat as closely interlinked) draws on Floridi's Information Ethics.
Miller	2015	Miller focuses on "maximally human-like automata as test cases for a theory of moral status." Many past contributions are critiqued, including those that emphasise ontological criteria and social-relational approaches. Noting that automata are created by humans and that humans "discern, affirm, and thereby realize human rights," Miller argues that, "within human rights institutions or in a liberal democracy one is not obliged to grant humanlike automata full human rights." Nevertheless, Miller concedes that, "there may be some justification" for granting a limited set of rights to automata.
Mosakas	2020	Mosakas argues that "phenomenal consciousness," which "underlies the morally relevant properties (such as sentience)," is "a necessary condition for accrediting moral status." Mosakas concludes that, "social robots should not be regarded as proper objects of moral concern unless and until they become capable of having conscious experience. Various alternative approaches, such as those of Gunkel, Coeckelbergh, Floridi, and Tavani, are critiqued.
Nakada	2011	This article is focused on a mostly irrelevant topic. However, results from surveys in 2008 (n = 500) and 2010 (n = 431) asking about views on robots in Japan are reported. Only 9.4% and 13.5% agreed with the statement: "Robots should be given similar rights in the future as fetuses or patients in a coma without consciousness or awareness." Additionally, 21.4% and 29.6% agreed with the statement: "Robots are expected to be a subject of affection or consideration in the future just as the earth, mountains, rivers are treated so, even though they have no life."
Nakada	2012	This focuses on a similar topic to Nakada (2011). The same survey results are reported, plus responses to the same survey questions from China and Thailand in 2010 and 2012, respectively. Chinese respondents seemed most supportive of robot rights, followed by Thai respondents.
Navajas et al.	2019	This study presented participants "with a set of moral scenarios" and asked them "to judge the acceptability of a controversial action." In smaller groups, participants "discussed their opinions to see whether they agreed on common values of acceptability." One scenario asked whether it was acceptable to delete an AI that was "indistinguishable from human intelligence." The authors do not report the results by scenario in the paper but the raw data is freely accessible for reanalysis.

Neely	2014	Neeley argues that "interests" is a more important criterion for the inclusion of intelligent machines in the "moral community" than sentience; sentience, self-awareness, and autonomy could all be sufficient. These features operate on spectrums that affect moral inclusion. The arguments could also apply to entities that are "not embodied and have only a virtual presence."
Nijssen et al.	2019	The first experiment found that, "robot-like robots were sacrificed significantly more often than humans and humanlike robots," though "the effect of humanized priming was the same for all three agent types." The second experiment suggested that the attribution of "affective states" had a larger effect on willingness to sacrifice entities than agency.
Nomura et al.	2018	In this study, Japanese students interacted with a robot and were asked survey questions. The results suggest that, "the participants having higher expectation of rapport with a robot showed more moral expansiveness for the robot" and "[t]he robot's relational behaviors... did not have effect on the participants' rapport expectation of the robot."
Nomura et al.	2019	This article describes the development of a "Moral Concern for Robots Scale (MCRS)." It includes adapted questions from several previous scales and was developed through a survey with 121 Japanese university students and a factor analysis on the results. It contains a subscale for "basic moral concern" for robots and another on "concern for psychological harm."
Nyholm	2019	Nyholm sees "whether we should extend any kind of moral consideration to robots that actually exist already or that will exist in the near future" as a "more pressing question, with greater real-world relevance" than whether they will warrant moral consideration in the more distant future. Views of other contributors -- Bryson, Gunkel, Coeckelbergh, Danaher, Darling and Richardson -- are summarized.
Obodiac	2012	Robots are considered within a broader discussion of citizenship. Various theories of citizenship are employed, especially the Greek concept of nomos.
Olivera-La Rosa	2018	This article examines "the phenomenology of the uncanny feeling," that people experience when encountering "human-like stimuli" such as humanoid robots. Relevant studies that have examined this are summarized and analyzed through a "social functionalist account." Olivera-La Rosa hypothesizes that the uncanny feeling "constrains the 'moral circle.'"
Pagallo	2010	Pagallo notes several legal precedents that could apply to the rights and obligations of artificial entities: "robots as killers," "robots as fridges," "robots as slaves," and "robots as pets." Pagallo also draws on Floridi to argue that robots are "moral 'patients' or receivers that deserve respect and protection."
Pagallo	2011	Pagallo notes several legal precedents that could apply to the rights and obligations of artificial entities: "robots as kids," "robots as pets," "robots as employees," and "robots as slaves." Like Floridi, Pagallo argues that "'good' or 'evil' can conveniently be represented as anything that enhances or damages the informational complexity of the whole" and comments that robots "are informational objects par excellence."
Petersen	2007	Petersen outlines a philosophical argument in defense of "designing robots so that they want to serve (more or less particular) human ends", but does not defend robot slavery, which is understood to mean "to be forced into work contrary to your will."
Petersen	2012	After outlining some previous arguments on the ethics of robot servitude, Petersen notes their belief that, "it is possible to create robots of ethical significance" — "artificial people" that "could have full ethical standing like our own." Nevertheless, as in their (2007) article, Petersen argues that designing robots so that "comply with our intentions for them to be our dedicated servants" could still be "ethical."
Piazza et al.	2014	The authors argue that "harmfulness... is an equally if not more important determinant of moral standing" than moral "patiency" or "agency." The authors' studies are of low relevance, but they summarize relevant research, such as one paper where "participants rated a range of [13 different] natural and unnatural entities," including a robot, "on attributes pertaining to what they labeled as 'experience'... and 'agency.'" These factors were found to be correlated.
Powers	2013	This is an article primarily about "moral agency of computers" with a brief discussion about moral patiency. Powers argues that agency and patiency are substantially separate and, contra Floridi, that "computers are unlikely to be moral patients."
Prescott	2017	Prescott argues that the description of robots as tools "assumes, all too easily, that we know the boundary conditions of future robotics development" and that, "[t]he ontological status of robots might be best described as liminal – neither living nor simply mechanical." Some psychological evidence is summarised. Prescott takes seriously the concern that, in the future, robots could "have some significant psychological capacities" but people would "still see them as just tools."
Puaschunder	2019	Robots and AI are presented as becoming increasingly autonomous and challenging perceptions of consciousness and legal personhood, "gaining human or quasi-human status." Some issues relating to death, killing, and suicide are discussed with occasional reference to AI.
Rademeyer	2017	After reviewing various previous writings relating to robot rights, Rademeyer uses a "causal layered analysis" to briefly explore three possible scenarios for the development of robot rights. Rademeyer suggests that the "equal rights" scenario would be the "preferable future." Discussions of "rapid technological advancement" and predictions of the singularity are used to convey urgency.
Rainey	2016	"This paper asks whether and how an artefact, such as a robot, could be considered a citizen... Three key notions emerge in the discussion: discursivity, embodiment and recognition." Rainey draws on Kant and Aristotle to argue that, "citizens must be a community, with a sense of community, and at least be disposed to taking an interest in the governance of that community."

Redan	2014	"How would we treat a robot as intelligent and complex as ourselves? Ben Redan argues that the justifications used to grant all humans a special moral status would also apply to advanced artificial intelligence, and that it may be in our collective interest to treat such entities the way we would like to be treated by them."
Reiss	2020	Reiss argues that, "given that robots are being made with ever greater powers of cognition, at some point these powers of cognition may reach the point at which we need to start talking of robots as having minds and being persons." Evolutionary, chemistry, historical (moral circle expansion) and theological perspectives are addressed briefly. Reiss encourages drawing comparisons to slavery and other precedents in moral education.
Richardson	2016	Richardson compares "the rights of machines" to slavery and other human rights issues, arguing that, "[e]xtending rights to machines has the potential to reduce the idea of what it means to be human."
Richardson	2019	Various aspects of human-robot interaction are explored "by reference to the work of Martin Buber in I and Thou." Richardson argues that robots are commodities whereas animals are not, so comparison between robots and animals is unhelpful.
Risse	2019	Risse Distinguishes between the "medium term" where machines do not yet "come up for moral consideration," and the "long term" where they plausibly will have moral status, even if they are not conscious. Theories of consciousness are discussed.
Robertson	2014	Robertson discusses and analyzes elements of Japanese culture that relate to robot rights. The example of the treatment of Paro, the care robot, is discussed.
Rodogno	2017	This chapter argues that, "as long as robots lack certain features, they can be neither moral agents nor moral patients." Previous contributions are critiqued and the "psychological and biological bases" for seeing current artificial entities as moral agents or patients are considered.
Russell	2009	Russell discusses the potential rights of sex robots. Russell argues that humanoid robots could become conscious in the future "and therefore deserving of 'intrinsic rights' far beyond the legal personhood status for regulatory purposes." Some potential legal pathways to granting rights to robots are discussed. Sex with robots is seen as a potential catalyst.
Sætra	2019	Sætra discusses several possible criteria for demarcating animals or AI from humans or for granting them moral consideration, including "reason," the capacities for science and language, consciousness, emotions, and moral capacity. These are critiqued and Sætra notes that, "it is increasingly difficult for us to place a philosophically sound border between us and them."
San José et al.	2016	The authors assume that, in the future, superintelligent AI "will have consciousness" and perhaps "an even higher moral status than humans." They explore philosophical issues if this assumption is taken, using "Kant's definition of consciousness and variations of utilitarianism."
Sarathy et al.	2019	The authors discuss "consent" as "a distinct, critical area for HRI research." There is some brief discussion of abuse of robots. They note that verbal abuse towards machines might not matter morally, apart from insofar as it "sets the wrong normative tone in the environment" and may have negative indirect effects on observers.
Schafer	2016	Schafer analyzes the European Parliament's Resolution that relates to electronic personhood and discusses it through comparison and analogy to science fiction writings.
Scheessele	2018	The article argues that, "some current and foreseeable intelligent machines have approximately as much moral status as plants, trees, and other environmental entities... the upper limit of our obligations should not exceed the upper limit of our obligations toward plants, trees, and other environmental entities." "Moral agency" is seen as a key criterion and consciousness is not presented as required for an entity to have "a good of its own."
Schmetkamp	2020	Schmetkamp argues that we can have empathy for social robots. Schmetkamp discusses several adjacent moral issues and notes that, "robots do not actually feel or experience anything," but does not focus specifically on moral status.
Schwitzgebel and Garza	2015	Schwitzgebel and Garza argue that "artificially intelligent beings" could exist that would deserve moral consideration, especially if they were created by humans. They argue that, "there must be some relevant difference between the two entities that grounds [any] difference in moral status." They defend this argument against possible Kantian, utilitarian, Aristotelian and social-relational objections. They make some recommendations for AI design to reflect this.
Sheliazhenko	2019	This short article focuses on the description of a "[m]odel program of judge autonomy... written in Java programming language." The abstract argues for immediate increases in rights for robots, but the reasoning is unclear and the article does not seem to elaborate on this.
Sijie	2020	Sijie uses an "ant colony optimization" algorithim to, "improve the path planning ability of the intelligent robot, and it is simulated to analyze the personality rights of the intelligent robot." Based on the findings, Sijie argues that robots will inevitably given personality rights as they become more intelligent.
Siponen	2004	Floridi's Information Ethics is summarized and critiqued. Siponen argues, for example, that Information Ethics is "too all-embracing, if the killing of an insect (e.g., a cockroach) is morally wrong in every case."
Sittler	2018	This paper discusses "[t]he expected value of the long-term future." Though not referring directly to artificial sentience, it discusses risk factors for suffering of artificial entities and actions that could be taken to address them. In citing Sotala and Gloor (2017) and using phrases such as "powerless sentient beings," it seems likely that the author is intending to consider the implications for artificial sentience.

Smids	2020	Smids offers four criticisms of Danaher's (2020) theory of ethical behaviorism. For example, one critique is that, "Ontology Matters (a Lot)" and "inner" states are crucial. Smids sees "sentience and cognitive capacities" as the "properties that may ultimately ground moral status" and "rights" and "duties" are only discussed through direct quotes.
Sommer et al.	2019	In this study, "Children (4–10 years of age, N = 126) watched videos of six different entities having a box placed over them that was subsequently struck by a human hand. The results suggest that, "[c]hildren afforded robotic entities less moral concern than living entities but afforded them more moral concern than nonliving entities, and these effects became more pronounced with age." Correlates and predictors are examined.
Sotala and Gloor	2017	Sotala and Gloor summarize three "pathways that could lead to the instantiation of large numbers of suffering subroutines" in the future: "Anthropocentrism," "[i]ndifference" to human values, or "[u]ncooperativeness" to other moral frameworks. They also note that, "simulations of sentient beings" might exist and suffer on vast scales. This is presented as a clearly negative outcome and risks recommendations are made for actions to reduce risks of astronomical future suffering.
Sparrow	2004	Sparrow proposes a test for when machines have achieved "moral standing comparable to a human" -- when replacing a human with a machine in a moral dilemma "leaves the character of the dilemma intact." Sparrow argues that, though machines' cognitive abilities will increase, they will not achieve full "personhood," which also implies "an interdependent network of moral and affective responses, such as remorse, grief and sympathy," unless they are given human form.
Sparrow	2012	As in their 2004 paper, Sparrow proposes a test for when machines have achieved "moral standing comparable to a human" -- when replacing a human with a machine in a moral dilemma "leaves the character of the dilemma intact." This is about more than just extending the concept of *Homo sapiens,* which might imply that AI would take moral priority over humans.
Sparrow	2020	Sparrow argues that, "[e]ven if an agent's 'cruel' treatment of a robot has no implications for their future behaviour towards people or animals... [it] gives us reason to criticise their actions. Viciousness towards robots is real viciousness." However, "[o]nly in the rare case where it might be reasonable for someone to mistake a robot for the thing that it represents might spontaneous expressions of emotion and concomitant actions be virtuous."
Spence	2012	Spence evaluates Floridi's Information Ethics. Spence argues that ethical value comes from "purposive agency" rather than status as an informational object. Hence, non-sentient artificial entities may have moral value "inherently but conditionally by rational design," whereas sentient beings have moral value "intrinsically and unconditionally."
Spence et al.	2018	Spence, Edwards, and Edwards examined "willingness to sign a petition urging the United Nations to form a working group on the issue," with participants being sent the request either by "a human confederate or Softbank's Pepper humanoid robot." 46% (n = 78) were willing to sign the petition. Using multiple regression, they found that,"[n]egative attitudes toward robots, prior experience interacting with robots, and perceived credibility of the petitioning agent were significant predictors."
Spennemann	2007	Spennemann focuses on "cultural heritage" rights and argues that the justifications for granting rights to "great apes" might also apply to "future AI-driven robots" that "have the ability to make reflective decisions." This would necessitate "processes that ensure that these rights are not violated when we are dealing with robotic heritage places and artefacts."
Stapleton	2018	Stapleton focuses mostly on moral agency, but also briefly discusses patiency, noting that, "animals can be moral patients because they are sentient," whereas "[r]obots may never be truly sentient and may never be designed to suffer (or even have emotions)." Intuitively, we might also feel that "a high level of intelligence" is sufficient for moral patiency, but if we use this criteria for robots it should apply to networks of animals, plants, or fungi too.
Starmans and Friedman	2016	Starmans and Friedman found that their study participants "were less likely to judge that [an] entity was owned when it was described as autonomous... and this pattern held regardless of whether the entity was a human or an alien (Experiments 1 and 3), a robot (Experiments 2 and 3), or a human-like biological creation (Experiment 2)." They also found that participants were "less likely to judge that humans are owned compared with other kinds of entities."
Sullins	2005	This paper considers a number of different ethical questions relating to "artificial life." Sullins briefly argues that artificial life should be granted moral consideration in the future if their cognitive capacities advance sufficiently, but could also warrant some moral consideration for similar reasons that environmental ethics grants ecosystems some moral consideration.
Sumantri	2019	Sumantri discusses various paths to regulating robots, noting, for example, that, "[i]f Indonesia follows in Saudi Arabia's footsteps, then the responsibility will be borne by the AI robot as a citizen. The robot will have the right to sue and be sued" and be treated similarly to humans. The precedent of animals is also considered. Human interests are centred. No clear recommendations are made, though the issue is presented as urgent.
Summers	2016	Summers examines citizenship, voting rights, and other issues for AI and digital human minds. Summers predicts a "blurring lines between human and machine, introducing an environment in which machines are seen as being persons." These topics are discussed with reference to science fiction films and "Marin Heidegger's Philosophy of Technology."

Suzuki et al.	2015	Suzuki et al. "performed electroencephalography in 15 healthy adults who observed either human- or robot-hand pictures in painful or non-painful situations such as a finger cut by a knife." Their results suggest that, "we empathize with humanoid robots in late top-down processing similarly to human others. However, the beginning of the top-down process of empathy is weaker for robots than for humans."
Swiderska and Küster	2018	This online study with 217 US participants found that, "both robotic and human-like avatars were imbued with mind to a higher degree" when they were presented with a facial wound, "irrespective of the baseline level of mind attributed to their unharmed counterparts."
Swiderska and Küster	2020	Across several experiments, Swiderska and Küster found that, "[h]armful robotic agents were consistently imbued with mental states to a lower degree than benevolent agents" and that, "a human moral patient appeared to suffer less when depicted with a robotic agent than with another human. The findings suggest that future robots may become subject to humanlike dehumanization mechanisms, which challenges the established beliefs about anthropomorphism."
Taraban	2020	Taraban focuses on the "emerging interdisciplinary field" of neurorobotics. A few news stories relating to the "Rights of Intelligent Robots" (such as the robot Sophia being granted citizenship) are summarized. Rhetorical questions are asked about robot rights. Taraban comments that robots may demand rights.
Tavani	2008	This article focuses primarily on the topic of information privacy. However, it begins with a summary of Floridi's Information Ethics, including its approach to moral patiency.
Tavani	2018	Tavani begins with a thorough review of existing works on questions relating to whether social robots qualify for moral consideration. Tavani argues that the question of whether to grant rights to robots "is ambiguous and imprecise." Tavani argues that humans may have "a direct moral duty" to nonhumans, including social robots, as part of "being-in-the-technological-world."
Theodorou	2020	Noting the possibility for both moral agency and patiency of artificial entities, Theodorou argues that, "culture determines the moral status of all entities, as morality and law are human-made 'fictions' that help us guide our actions. This means that our moral spectrum can be altered to include machines. However, there are both descriptive and normative arguments for why such a move is not only avoidable, but also should be avoided."
Toivakainen	2016	This paper critiques Gunkel with reference to Levinas and several other theorists. The discussion of moral patiency is brief. Toivakainen argues that, unlike in the case of "living beings," "the ethical responsibility in the case of artefacts is a responsibility towards ourselves and the kinds of persons we are."
Toivakainen	2018	Toivakainen offers "brief critical remarks on the question of 'robot rights,'" arguing that, "[a]lthough robots and other automation technologies are part of the dialectics of labor and equality, it is not the robots (themselves) that we need to think of in moral terms but rather the drive of instrumental reason behind it."
Tollon	2019	This is a philosophy MA thesis, primarily focused on whether artificial entities can be moral agents, with some discussion of moral patiency. Tollon argues that, "machines may conceivably be moral patients in the future" and "there is a strong case to be made that they are (or will very soon be) moral agents."
Tollon	2020	Tollon critiques he Organic View outlined by Torrance (2008). Following Coeckelbergh, Tollon prioritizes critiques reliance on "ontological features" of entities for decision-making about whether to grant them moral consideration. Noting that our intuitions about sentience may be incorrect, Tollon argues that we can also reasonably use "behavioral cues" and "other relevant social-relational criteria."
Tomasik	2011	Tomasik argues that there could be "astronomical future suffering" through the "[s]pread of wild animals," the running of "[s]entient simulations... that are sufficiently self-aware as to feel what we consider conscious pain," the creation of "[s]uffering subroutines," i.e. "certain algorithms" that "might be sufficiently similar to the pain programs in our own brains that we consider them to actually suffer," or "[b]lack swans." Given vast computing power, "digital suffering" may "vastly outweigh" biological suffering.
Tomasik	2013	This article, motivated to reduce the risk that artificial sentience suffers on an astronomical scale, discusses factors and interventions that could affect the risk of this happening, such as encouraging "[b]ig-picture, cosmopolitan thinking." Tomasik argues that technical research in "[a]rtificial consciousness seems net harmful to advance," but encourages philosophical dialogue.
Tomasik	2014	Tomasik argues that, "present-day artificial RL [reinforcement learning] agents have a very small but nonzero degree of ethical importance. This is particularly plausible for views according to which sentience comes in degrees based on the abilities and complexities of minds... [RL programs] may become more significant in the coming decades as RL is increasingly applied to industry, robotics, video games, and other areas."
Tonkens	2012	Tonkens examines "whether the creation of virtuous autonomous machines is morally permitted" and argues that, "the creation of such machines violates certain tenets of virtue ethics, and hence that the creation and use of those machines is impermissible."
Torrance	2005	Torrance considers moral agency and patiency for machines, with sentience and rationality as relevant criteria. One "robust response" would be that machines will never warrant "moral respect" unless they are "organisms." But Torrance concludes that, "even if (non-organic) machines never achieve a fundamental moral status equivalent to that of humans... it looks as though there will nevertheless be many ways in which machines will be seen as fit holders of kinds of moral status."
Torrance	2006	Torrance notes that, under some views, consciousness might be "a strict requirement for full moral status" and that this is "arguably, a remote possibility for electronic beings." However, "there are still important ways in which non-conscious artificial agents could come to have moral responsibilities, and even rights, of sorts," such as through property ownership.

Torrance	2008	This paper is primarily focused on assessing whether artificial entities could ever be sentient. There is some discussion of wider societal and ethical implications. The "organic view" is defined, where "artificial humanoid agents" cannot count as moral agents or "appropriate targets of intrinsic moral concern" because they will not be sentient or have sufficient "empathic rationality." Torrance does not argue that this view is correct, however.
Torrance	2011	This article discusses moral patiency and agency or artificial entities. As with Torrance's (2013) article, approaches in machine ethics are explored through four categories: "anthropocentrism," "infocentrism," "biocentrism," and "ecocentrism."
Torrance	2013	This article discusses moral patiency and agency or artificial entities in relation to the context of Singer's terminology of speciesism and the expanding moral circle. Though Singer emphasizes sentience, Torrance notes that this might not be a requirement for moral consideration. Approaches in machine ethics are explored through four categories: "anthropocentric," "infocentric," "biocentric," and "ecocentric."
Torrance	2014	Torrance contrasts "realist" and "social-relational" perspectives on "judgments of the moral status of artificial agents," arguing in favor of the former and the importance of "conscious satisfaction or suffering." Torrance accepts that determining consciousness is difficult but argues that it is still important. Torrance argues that current artificial entities do not have conscious satisfaction or suffering but that future artificial entities might.
Torres	2018	Torres argues that argues that space colonization is undesirable because it increases the risk of various forms of astronomical suffering. Torres evaluates strategies to reduce this risk. Torres briefly cites various Tomasik papers to note that, "someone somewhere" would run sentient simulations and "create new biospheres in which wild animals are subject to Darwinian misery."
Torres	2020	Torres explores whether anti-natalists can oppose human extinction. In doing so, Torres discusses "whole-brain emulation" and "mind-uploading," both of which would blur the distinction between humanity and artificial sentience. Torres notes uncertainty about whether and when these technologies will be developed, but seems to assume that "ems" or uploaded minds would warrant moral consideration, such as noting that terminating "ems" would constitute mind crime.
Turchin	2019	This paper argues that "A Computer Simulation of the Past Could be Used for Technological Resurrection," which is seen to be a broadly positive development. Some ethical concerns, such as mind crime, are discussed, though the assumption of the paper seems to be that simulated lives have moral value.
Turchin et al.	2019	The authors explore "what is the most probable type of simulation in which humanity lives (if any) and how this affects simulation termination risks." The article seems to assume that simulations could be morally important, since all known life could simply be simulated.
Turner	2019	Turner considers various legal issues relating to AI, including discussing AI and robot rights from both a legal and moral perspective. Turner gives four reasons why we might want to consider granting rights to robots: "(i) if they are conscious and can suffer; (ii) from compassion, if they appear to be conscious; (iii) their value to humans; and (iv) where humans and AI may are combined."
Tzafestas	2016	Consciousness, "feelings," and "interest" are seen as criteria for robot rights. Bryson's, Kantian, and contractualist perspectives are summarized. This is a fairly brief discussion in a chapter summarizing various issues in roboethics.
Umbrello and Sorgner	2019	This paper focuses on the possibility of suffering in "nonconscious" artificial entities and whether they warrant moral consideration. Umbrello and Sorgner remain open to the possibility and encourage further research into how "nonconscious cognitive suffering... may be instantiated in wetware developments in AI research."
Vadymovych	2017	Vadymovych considers robot rights from the perspective of legal precedent. Vadymovych argues for legal personhood and rights for robots.
Van den Berg	2011	Van den Berg focuses broadly on "techno-regulation" -- robot rights is considered only briefly. A few relevant contributions are summarized. Comparisons are made to the legal status of animals and other nonhuman entities.
Van den Hoven Van Genderen	2018	Van Genderen discusses the possibility of legal personhood rights for AI entities with relation to whether such entities will be able to become "legal actor[s] with legal capacity" and whether they are "natural persons." The precedents of slaves, women, animals, and corporations are considered and several theories of personhood are summarized. AI personhood is more or less possible within these different conceptualizations of personhood.
Vanman and Kappas	2019	This is a review of social psychological research about "Social Robots for Intergroup Relations." It notes, for example, that, "[p]eople tend to perceive social robots as autonomous and capable of having a mind... As social robots become more human like, people may also feel greater empathy for them," but this can also "challenge our human distinctiveness, threaten our identity, and elicit suspicion."
Vize	2011	Vize examines moral consideration of machines from a utilitarian perspective, drawing on Peter Singer, arguing that "sentience is both necessary and sufficient for moral considerability, and utilitarians must take care to avoid substratism." Vize argues that, "because the methods we use to tell if another being is conscious are unreliable in the case of machines, then the proper attitude toward machine consciousness is agnosticism."
Voiculescu	2020	Voiculescu analyzes documents from international organizations relating to legal and ethical issues "so that human rights standards are adapted to new conceptual and content challenges."

Wallkötter et al.	2020	In two online experiments, the authors show that both framing of the robots as having high or low mind and manipulated descriptions of robots' level of social engagement with humans "independently influence participants' mind perception" of robots. "However, when we combined both variables in the following real-world experiment, these effects failed to replicate."
Wang and Krumhuber	2018	In two experiments, the authors found that "robots with social function were perceived to possess greater ability for emotional experience, but not cognition, compared to those with economic function and whose function was not mentioned explicitly." A further two experiments found that economic and social value affected ascriptions of cognitive and emotional capacity.
Ward et al.	2013	Ward, Olsen, and Wegner conducted four experiments and "found that observing intentional harm to an unconscious entity—a vegetative patient, a robot, or a corpse—leads to augmented attribution of mind to that entity. A fifth experiment reconciled these results with extant research on dehumanization by showing that observing the victimization of conscious entities leads to reduced attribution of mind to those entities."
Wareham	2013	Wareham argues that consequentialist and "interest-based theories" of moral status "should be rejected, since they undermine the ideal that persons are moral equals." In contrast, "respect-based theories," "based on kantian and contractualist accounts," are presented as more intuitive. This suggests that, "an artificial agent has moral status equal to that of a person if it has the capacity for reflective self-control." Wareham argues that psychological testing could shed light on this.
Warwick	2010	Warwick examines the topic of "culturing neural tissue and embodying it in a mobile robot platform," including the technology itself and several related ethical issues. Given that these robots could have "more brain cells than a cat, dog or chimpanzee," Warwick suggests that, "[s]urely a human neuron robot must have [the same rights as animals] and more?"
Warwick	2012	As in their 2010 paper, Warwick examines the idea of a robot with a biological brain, which could be developed soon. Given the biological brain, Searle's Chinese Room argument against AI consciousness would not apply. Warwick asks: "If a robot body contains a brain of 100 billion human neurons then should that robot be afforded the same rights as a human?"
Waser	2012	Waser argues that "we need to stop instinctively and reflexively acting on our different evolved ratchets and work together fleshing out our top-down design and justifications until everyone can accept it as moral." Waser sees one implication of this as being that "Safety and Morality REQUIRE the Recognition of Self-Improving Machines as Moral/Justice Patients and Agents."
Wegloop and Vach	2020	The authors argue that it is not possible to simulate consciousness then briefly explore several ethical implications of this, such as that there is no ethical difference between simulating a suffering human or a happy human. However, they note that their arguments do not show that "robots do not suffer" and suggest it might sometimes still be best to behave as if simulations were conscious.
Weng et al.	2009	The authors consider legal precedent for the treatment of robots, including a brief section on robot rights. They argue that, if we take certain legal pathways, "we may need to spell out robot rights and responsibilities in the same manner that we do for such non-human entities as corporations."
Winsby	2013	Assuming that, "pain has a certain (unpleasant) character" and that, "beings that can feel pain are owed some level of moral consideration," Winsby argues that "pain engineering in AI is prima facie morally wrong."
Wortham	2018	Through surveys on Amazon Mechanical Turk, Wortham finds that, "the addition of a visual or vocalised representation of the internal processing and state of a robot significantly improves the ability of a naive observer to form an accurate model of a robot's capabilities, intentions and purpose." Additionally, "A zoomorphic robot is perceived as more intelligent and more likeable than a very similar mechanomorphic robot."
Wright	2019	Wright argues that sentience and self-awareness are insufficient to grant constitutional rights to "advanced robots"; "both objective and subjectively adopted interests" are also required. Wright argues that granting rights excessively to entities without such "interests" could cause "avoidable net suffering" to other entities, though artificial entities need not be equal to humans to warrant rights.. Various other specific rights and risks are considered.
Wu	2012	Wu discusses rights relating to "machine speech." The legal precedent of animals and corporations is considered. The usage of the US Constitution's First Amendment is examined in detail. Wu argues that "merely functional" speech and speech by tools doesn't tend to be granted First Amendment protection. Some artificially created "speech product[s]" can be protected.
Wurah	2017	Wurah looks at legal personality for robots through comparison to corporations, animals, and human rights theories. Whereas animal rights are conceptualized in terms of protecting the animals, "electronic personality" is conceptualized more in terms of protecting humans. Wurah remains neutral on the question of whether robots should be granted rights or not.
Yampolskiy	2013	Yampolskiy focuses mostly on protecting humanity against artificial general intelligence. Robot rights and other aspects of robot ethics are seen as distractions from more important topics. Yampolskiy argues that "machines should be inferior by design; they should have no rights and should be expendable as needed... since machines can't feel pain."
Yampolskiy	2017	Yampolskiy argues that, "computers are... at least rudimentarily conscious with potential to eventually reach superconsciousness" and proposes "a test for confirming certain subjective experiences." This consciousness is seen to make artificial entities (including simulations) potential rights holders and moral patients.

Author(s)	Date		
Yanke	2020	Looking at legal precedent for modification of marriage laws in the US, Yanke argues that robots will have to possess sentience and autonomy to marry, but that, "it is social acceptance... rather than personhood criteria" will most influence legal development. Citing Singer, Yanke argues that, "AIs with specific human-like qualities cannot be justifiably denied certain rights."	
Zenor	2018	Zenor "suggests that an AI movement would parallel other civil rights movements and examines what legal doctrines could support legal personhood for artificial intelligence."	
Ziesche and Yampolskiy	2018	Ziesche and Yampolskiy focus on the interests of artificial sentience "to avoid suffering and to have the freedom of choice about their deletion." Sentience is seen as the key criteria for moral patiency. Several plausible future outcomes for artificial sentience are considered. They suggest the creation of "the new field of AI welfare science" which would contribute both to "antispeciesism" and "AI safety."	
Ziesche and Yampolskiy	2019	Ziesche and Yampolskiy argue that, in order to transfer human minds to "other substrates... numerous other potentially sentient beings will have to be created." They analyze "the additional suffering and mind crimes that these scenarios might entail." They suggest creating indicators of artificial suffering. Tomasik and Bostrom are cited as arguing that artificial sentience may come to exist and may have "moral status."	

Table 7: Categorization and scoring of search results

Author(s)	Date	Search terms / identified how	Search term categories	Discipline	Country of institution	Argues for moral consideration?	Primary framework or moral schema used	Google Scholar citations
Abdullah	2018	Google Scholar: 1	Rights	Other humanities	Malaysia	3.5	Deontological	0
Adam	2008	Google Scholar: 7 and ACM Digital Library: 5 and 7	Moral	Other social sciences	United Kingdom	NA	NA	36
Akechi et al.	2018	Scopus: 5 and Web of Science: 5	Moral	Cognitive science	Japan	NA	NA	6
Al-Fedaghi	2007	Google Scholar: 5	Moral	Computer engineering or computer science	Kuwait	4.5	Information Ethics	3
Allen and Widdison	1996	Google Scholar: 4	Rights	Law	United Kingdom	4	Legal precedent	224
Anderson	2012	Google Scholar: 5 and 7 and Scopus: 7	Moral	Philosophy or ethics	United States	NA	NA	5
Andreotta	2020	Google Scholar: 1, Scopus: 5 and Web of Science: 5	Rights / Moral	Philosophy or ethics	Australia	4	Mixture (deontological, consequentialist)	0
Armstrong et al.	2012	Google Scholar: 9 and ACM Digital Library: 9	Suffering	Other or unidentifiable	United Kingdom	4	NA	85
Arnold and Gough	2017	Google Scholar: 2	Rights	Law	Australia	NA	NA	0
Asaro	2001	ACM Digital Library: 1	Rights	Philosophy or ethics / Computer engineering or computer science	United States	NA	NA	0
Asekhauno and Osemwegie	2019	Google Scholar: 4	Rights	English literature or language / Other humanities	Iran	3.5	Unclear	0

Author	Year	Database	Type	Discipline	Country		Framework	Citations
Ashrafian	2015a	Google Scholar: 5	Moral	Medical or biology	United Kingdom	4	Unclear	36
Ashrafian	2015b	Google Scholar: 1	Rights	Medical or biology	United Kingdom	NA	NA	43
Barfield	2015	Google Scholar: 2	Rights	Other engineering	United States	4	Legal precedent	0
Barfield	2018	Google Scholar: 2	Rights	Other engineering	United States	NA	Legal precedent	15
Bartneck and Keijsers	2020	Google Scholar: 1	Rights	Other social sciences	New Zealand	NA	NA	0
Basl	2013a	Google Scholar: 7	Moral	Philosophy or ethics	United States	4	Mixture (consequentialist, deontological)	7
Basl	2013b	Google Scholar: 7	Moral	Philosophy or ethics	United States	4	Mixture (consequentialist, deontological)	0
Basl	2014	Google Scholar: 7 and Scopus: 7	Moral	Philosophy or ethics	United States	4	Mixture (consequentialist, deontological)	18
Beckers	2018	Google Scholar: 10	Suffering	Philosophy or ethics	Netherlands	4.5	Consequentialist	0
Belk	2018	Google Scholar: 1 and 3 and Scopus: 1	Rights	Business	Canada	4	Unclear	13
Bennett and Daly	2020	Google Scholar: 2 and Scopus: 1 and 2	Rights	Law	Australia	NA	Legal precedent	0
Beno	2019	Google Scholar: 1 and 2 and Scopus: 1	Rights	Other or unidentifiable	Slovakia	NA	NA	1
Bess	2018	Google Scholar: 3, Scopus: 3, and Web of Science: 3	Rights	History	United States	4	Mixture (deontological, virtue ethicist, consequentialist)	3
Bigman et al.	2019	Google Scholar: 1 and 6, ScienceDirect: 1 and 5 and 6, Scopus: 1, and Web of Science: 1	Rights / Moral	Psychology / Cognitive science	United States	NA	NA	28
Biondi	2019	Google Scholar: 5	Moral	Philosophy or ethics	United States	4.5	Mixture (consequentialist, deontological)	0
Birhane and van Dijk	2020	Google Scholar: 1, ACM Digital Library: 1, and Scopus: 1	Rights	Computer engineering or computer science	Ireland	1	NA	5
Birmingham	2008	Scopus: 5	Moral	Computer engineering or computer science	United States	1.5	Deontological	0
Bolonkin	2012	ScienceDirect: 1 and 2	Rights	Other or unidentifiable	United States	NA	NA	21
Bostrom	2014	Google Scholar: 9	Suffering	Philosophy or ethics	United Kingdom	4	Consequentialist	2513

Bostrom et al.	2016	Google Scholar: 9	Suffering	Philosophy or ethics	United Kingdom	4	NA	9
Brey and Søraker	2009	ScienceDirect: 5 and 7	Moral	Philosophy or ethics	Netherlands	NA	NA	62
Briggs	2015	Google Scholar: 7	Moral	Other social sciences / Computer engineering or computer science	United States	NA	NA	0
Briggs et al.	2014	Google Scholar: 7	Moral	Other social sciences / Computer engineering or computer science	United States	NA	NA	5
Broman and Finckenberg-Broman	2018	Google Scholar: 2	Rights	Law	Australia	4.5	Legal precedent	0
Bryson	2012	Google Scholar: 7	Moral	Computer engineering or computer science	United Kingdom	1	Consequentialist	5
Bryson	2018	Google Scholar: 1 and 7, ACM Digital Library: 7, Scopus: 7, and Web of Science: 7	Rights / Moral	Computer engineering or computer science	United Kingdom	1	Consequentialist	45
Bryson et al.	2017	ACM Digital Library: 7	Moral	Computer engineering or computer science	United Kingdom	1.5	Mixture (legal precedent, consequentialist)	103
Calo	2016	Google Scholar: 2	Rights	Law	United States	NA	Legal precedent	48
Calverley	2011	Google Scholar: 3 and Scopus: 3	Rights	Law	United States	4	Mixture (legal precedent, consequentialist, deontological)	15
Cappuccio et al.	2020	Google Scholar: 5 and 7 and Scopus: 5 and 7	Moral	Other engineering / information technology	Australia	4.5	Mixture (virtue ethicist, social-relational)	3
Cave et al.	2019	Google Scholar: 7	Moral	Philosophy or ethics	United Kingdom	4.5	Deontological	6
Celotto	2019	Google Scholar: 3, Scopus: 3, and Web of Science: 3	Rights	Law	Italy	NA	Unclear	1
Čerka et al.	2017	ScienceDirect: 2	Rights	Law	Lithuania	NA	Legal precedent	41
Chernyak and Gary	2016	Google Scholar: 5 and 6 and Scopus: 5	Moral	Psychology / Cognitive science	United States	NA	NA	11
Chesterman	2020	Google Scholar: 2	Rights	Law	Singapore	3	Legal precedent	0
Chinen	2016	Google Scholar: 7	Moral	Law	United States	NA	Legal precedent	13
Chomanski	2019	Google Scholar: 6	Moral	Philosophy or ethics	United States	3.5	Virtue ethicist	3

Author	Year	Search source	Rights/Moral	Field	Country	Score	Framework	Citations
Chopra	2010	Google Scholar: 2 and ACM Digital Library: 2	Rights	Philosophy or ethics	United States	3	NA	16
Church	2019	Google Scholar: 3	Rights	Medical or biology	United States	NA	NA	17
Coeckelbergh	2010a	Google Scholar: 5 and 7 and ACM Digital Library: 5 and 7	Moral	Philosophy or ethics	Netherlands	4	Social-relational	95
Coeckelbergh	2010b	Google Scholar: 1, 5, and 7, ACM Digital Library: 1, 5, and 7, Scopus: 1 and 5, and Web of Science: 1 and 5	Rights / Moral	Philosophy or ethics	Netherlands	3.5	Social-relational	135
Coeckelbergh	2013	Google Scholar: 5 and 7 and ACM Digital Library: 5 and 7	Moral	Philosophy or ethics	Netherlands	NA	NA	2
Coeckelbergh	2014	Google Scholar: 7	Moral	Philosophy or ethics	Netherlands	4	Social-relational	49
Coeckelbergh	2018	Google Scholar: 7	Moral	Philosophy or ethics	Austria	3.5	Social-relational	4
Coeckelbergh	2020	Google Scholar: 7	Moral	Philosophy or ethics	Austria	4	Social-relational	5
Craig et al.	2019	Google Scholar: 1 and 2, ACM Digital Library: 1 and 2, and Scopus: 1	Rights	Communication or media / Robotics	United States	NA	NA	1
Dall'Agnol, Darlei	2020	Google Scholar: 1	Rights	Philosophy or ethics	Brazil	4.5	Mixture (consequentialist, deontological, virtue ethicist, legal precedent)	0
Damholdt et al.	2020	Google Scholar: 7	Moral	Medical or biology	Denmark	NA	NA	0
Danaher	2020	Google Scholar: 5 and 6 and Scopus: 6	Moral	Law	Ireland	4.5	Other	17
Darling	2016	Google Scholar: 1, 2, and 5	Rights / Moral	Communication or media	United States	4	Deontological (but similarities to the "social relational" approach)	122
Davidson et al.	2019	Google Scholar: 5 and ACM Digital Library: 5	Moral	Psychology	Australia	NA	NA	0
Davies	2011	ScienceDirect: 3	Rights	Law	United Kingdom	4.5	Legal precedent	54
Dawes	2020	Google Scholar: 1	Rights	English literature or language	United States	NA	NA	0

Author	Year	Source	Approach	Discipline	Country	Score	Framework	Citations
De Graaf and Malle	2019	Google Scholar: 1 and ACM Digital Library: 1	Rights	Computer engineering or computer science / Information technology	Netherlands	NA	NA	15
DiPaolo	2019	Google Scholar: 1	Rights	Other social sciences	Canada	4.5	Unclear	0
Dixon	2015	Google Scholar: 2	Rights	Other social sciences	Netherlands	4.5	Unclear	0
Dracopoulou	2003	Google Scholar: 5	Moral	Medical or biology / other social sciences	United Kingdom	4	Mixture (consequentialist, deontological)	4
Drozdek	1994	Google Scholar: 3	Rights	Computer engineering or computer science	United States	2	Mixture (virtue ethicist, deontological)	1
Drozdek	2017	Google Scholar: 3	Rights	Computer engineering or computer science	United States	NA	NA	0
Erhardt and Mona	2016	Google Scholar: 3	Rights	Law	Switzerland	4	Unclear	5
Estrada	2018	Google Scholar: 1, ACM Digital Library: 1, and Scopus: 1	Rights	Philosophy or ethics	United States	4	Other	5
Estrada	2020	Google Scholar: 6	Moral	Philosophy or ethics	United States	4	Other	1
Fagan	2019	Scopus: 4	Rights	Law / Business	France	3	Legal precedent	0
Floridi	1999	ACM Digital Library: 5	Moral	Philosophy or ethics	United Kingdom	4.5	Information Ethics	579
Floridi	2002	ACM Digital Library: 5 and 7	Moral	Philosophy or ethics	Italy	4.5	Information Ethics	258
Floridi	2005	ACM Digital Library: 5 and 7	Moral	Philosophy or ethics	Italy	4.5	Information Ethics	169
Fox	2018	Google Scholar: 5 and 7	Moral	Philosophy or ethics	Netherlands	4	Social-relational	1
Frank and Nyholm	2017	Google Scholar: 1 and 2 and 5 and ACM Digital Library: 1, 2, and 5	Rights / Moral	Philosophy or ethics	Netherlands	4	Mixture (deontological, consequentialist, social-relational)	35
Fraune et al.	2017	Google Scholar: 5	Moral	Cognitive science	United States	NA	NA	13
Freier	2008	ACM Digital Library: 5	Moral	Other or unidentifiable	United States	NA	NA	14
Friedman	2019	Google Scholar: 1, 5, and 7	Moral	Philosophy or ethics	South Africa	4	Social-relational	0
Galanter	2020	Google Scholar: 5	Moral	Design	United States	4.5	Mixture (other, deontological, consequentialist)	0
Gamez et al.	2020	Google Scholar: 6, Scopus: 1, and Web of Science: 1	Rights / Moral	Philosophy or ethics	United States	4	Virtue ethicist	1

Author	Year	Database	Focus	Field	Country	Criteria	Framework	Citations
Gerdes	2015	Scopus: 7	Moral	Design / Communication or media	Denmark	NA	NA	1
Gerdes	2016	Google Scholar: 1 and 5 and ACM Digital Library: 1 and 5	Rights / Moral	Communication or media / Design	Denmark	1.5	Deontological	23
Gittinger	2019	Google Scholar: 2	Rights	Philosophy or ethics	United States	NA	NA	0
Gloor	2016b	Google Scholar: 8	Suffering	Other or unidentifiable	Germany	4.5	Mixture	5
Gordon	2020	Google Scholar: 2, 3, and 7, Scopus: 3, and Web of Science: 3	Rights / Moral	Philosophy or ethics / Political science	Lithuania	4	Mixture (consequentialist, deontological)	8
Gray and Wegner	2012	ScienceDirect: 2	Rights	Psychology	United States	NA	NA	294
Gregory	2012	Google Scholar: 5	Moral	Philosophy or ethics	Australia	3	Mixture (consequentialist, deontological, virtue ethicist)	0
Gualeni	2020	Google Scholar: 5, 6, and 7	Moral	Other or unidentifiable	Malta	4.5	Deontological	0
Gunkel	2007	Google Scholar: 5, ACM Digital Library: 5 and 7, and Scopus: 5	Moral	Communication or media	United States	NA	Other	21
Gunkel	2012	Google Scholar: 5 and 7 and ACM Digital Library: 5 and 7	Moral	Communication or media	United States	3	Other	239
Gunkel	2013	Google Scholar: 5 and ACM Digital Library: 5	Moral	Communication or media	United States	NA	Social-relational	3
Gunkel	2014	Google Scholar: 5 and 7 and Scopus: 5	Moral	Communication or media	United States	4	Social-relational	69
Gunkel	2015	Google Scholar: 3 and 5, Scopus: 3, and Web of Science: 3	Rights / Moral	Communication or media	United States	3.5	Social-relational	13
Gunkel	2018a	Google Scholar: 1 and 5 and Web of Science: 1	Rights / Moral	Communication or media	United States	4	Social-relational	93
Gunkel	2018b	Google Scholar: 3 and 5	Rights / Moral	Communication or media	United States	4	Social-relational	3
Gunkel	2018c	Google Scholar: 1, 5, and 7	Rights / Moral	Communication or media	United States	NA	Social-relational	51
Gunkel	2018d	Scopus: 5	Moral	Communication or media	United States	4	Social-relational	0
Gunkel	2019a	Google Scholar: 5	Moral	Communication or media	United States	4	Social-relational	2

Author	Year	Source	Type	Field	Country	Score	Framework	Count
Gunkel	2019b	Google Scholar: 1	Rights	Communication or media	United States	4	Social-relational	0
Gunkel	2020a	Google Scholar: 1, 5, and 6	Rights / Moral	Communication or media	United States	NA	NA	1
Gunkel	2020b	Google Scholar: 1, 2, and 5	Rights / Moral	Communication or media	United States	4	Social-relational	0
Gunkel and Cripe	2014	Google Scholar: 5	Moral	Communication or media	United States	4	Social-relational	1
Hagendorff	2020	Google Scholar: 1, ACM Digital Library: 5, and Scopus: 5	Rights / Moral	Philosophy or ethics	Germany	4	Virtue ethicist	1
Hale	2009	Google Scholar: 6	Moral	Philosophy or ethics	United States	4	Other	11
Hall	2005	Scopus: 5	Moral	Computer engineering or computer science	United Kingdom	NA	NA	1
Hallqvist	2018	Google Scholar: 2	Rights	Other social sciences	Sweden	NA	NA	0
Hanák	2019	Google Scholar: 3 and 4	Rights	Philosophy or ethics	Czecia	2.5	Mixture (legal precedent, consequentialist, deontological)	0
Hartmann	2017	Google Scholar: 6	Moral	Communication or media	Netherlands	NA	NA	24
Himma	2003	Google Scholar: 7 and ACM Digital Library: 5 and 7	Moral	Philosophy or ethics	United States	4	Mixture (deontological, consequentialist)	25
Himma	2004	ACM Digital Library: 5 and 7	Moral	Philosophy or ethics	United States	3	Mixture (deontological, consequentialist)	43
Hoffmann and Hahn	2020	Scopus: 7 and Web of Science: 7	Moral	Other or unidentifiable	Switzerland	4	Social-relational	0
Hogan	2017	Google Scholar: 5 and 7 and ACM Digital Library: 1, 5, and 7	Moral	Philosophy or ethics	United States	NA	NA	4
Holder et al.	2016	Google Scholar: 2	Rights	Law	United Kingdom	NA	Legal precedent	20
Holm and Powell	2013	ScienceDirect: 5	Moral	Philosophy or ethics / Communication or media	Denmark	NA	NA	12
Holy-Luczaj and Blok	2019	Google Scholar: 6	Moral	Philosophy or ethics	Poland	4.5	Other	1
Hu	2018	Google Scholar: 1	Rights	Law	United States	NA	Legal precedent	0
Hughes	2005	Google Scholar: 2	Rights	Other or unidentifiable	United States	NA	NA	23
Huttunen et al.	2010	Google Scholar: 1 and 2	Rights	Law	Finland	4.5	Legal precedent	12
Inayatullah	2001	Google Scholar: 1	Rights	Future studies / Political science	Taiwan	4	Mixture (legal precedent, other)	3

Inyashkin	2016	Google Scholar: 1	Rights	Other humanities	Russia	NA	NA	0
Jack et al.	2013	Google Scholar: 5	Moral	Cognitive science	United States	NA	NA	70
Jackson Jr	2018a	Google Scholar: 9	Suffering	Other or unidentifiable	United States	3.5	Unclear	1
Jackson Jr	2018b	Google Scholar: 9	Suffering	Other or unidentifiable	United States	3	Unclear	7
Jackson and Williams	2019	Google Scholar: 7	Moral	Computer engineering or computer science	United States	NA	NA	7
Jaynes	2020	Google Scholar: 3 and 4, Scopus: 4, and Web of Science: 4	Rights	Other or unidentifiable	United States	5	Other ("capabilities-based altruism")	3
Johnson and Miller	2008	ACM Digital Library: 5	Moral	Philosophy or ethics	United States	2	Unclear	60
Johnson and Verdicchio	2018	Google Scholar: 1 and 7, ACM Digital Library: 1, and 7	Rights / Moral	Philosophy or ethics	United States	1.5	Mixture (consequentialist, deontological, legal precedent)	9
Jowitt	2020	Google Scholar: 4	Rights	Law	United Kingdom	4.0	Mixture (deontological, legal precedent)	0
Kaminska	2016	Google Scholar: 2	Rights	Law	Netherlands	4	Unclear	0
Kaufman	1994	Google Scholar: 5 and Web of Science: 5	Moral	Philosophy or ethics	United States	3	Other	12
Kelley and Atreides	2020	Google Scholar: Google Scholar: 3 and ScienceDirect: 3	Rights	Robotics	United States	4.5	NA	1
Khoury	2016	Google Scholar: 1 and 2	Rights	Law	Israel	1	Legal precedent	26
Kim and Petrina	2006	Google Scholar: 1, 2, and 3	Rights	Other social sciences	United States	NA	NA	2
Kiršienė and Amilevičius	2020	Google Scholar: 2	Rights	Law	Lithuania	3.5	Legal precedent	0
Klein	2016	Google Scholar: 2 and 5, ACM Digital Library: 5 and 7	Rights / Moral	Communication or media	China	4	Consequentialist	4
Klein	2019	Google Scholar: 5	Moral	Communication or media	China	4	Consequentialist	0
Klein and Lin	2018	ACM Digital Library: 5	Moral	Communication or media	China	4	Unclear	2
Kljajić	2019	Google Scholar: 8	Suffering	Philosophy or ethics	Croatia	3.5	Mixture	0
Kolling et al.	2016	ScienceDirect: 5	Moral	Psychology	Germany	NA	NA	7
Kovic	2020	Google Scholar: 10	Suffering	Other or unidentifiable	Switzerland	4	NA	0

Author	Year	Source	Rights/Moral	Discipline	Country		Framework	Count
Krämer	2020	Google Scholar: 2	Rights	Computer engineering or computer science	Germany	NA	NA	0
Krebs	2006	Google Scholar: 2	Rights	History	Germany	NA	NA	18
Kunnari	2020	Google Scholar: 7	Moral	English literature or language	Finland	NA	NA	0
Kuran	2020	Google Scholar: 5 and 7	Moral	Other or unidentifiable	Unclear	4	Mixture (deontological, consequentialist)	0
Küster and Świderska	2016	Google Scholar: 5 and 7 and Scopus: 5 and 7	Moral	Psychology	Germany	NA	NA	3
Küster and Swiderska	2020	Google Scholar: 5 and 7	Moral	Computer engineering or computer science	Germany	NA	NA	0
Küster et al.	2020	Google Scholar: 7	Moral	Computer engineering or computer science	Germany	NA	NA	1
Laukyte	2017	ACM Digital Library: 5	Moral	Law	Spain	4	Legal precedent	9
Laukyte	2019	Google Scholar: 5	Moral	Law	Spain	4.5	Other	0
Laukyte	2020	Google Scholar: 1	Rights	Law	Spain	NA	Legal precedent	1
Laulhe-Shaelou	2019	Google Scholar: 1	Rights	Law	Cyprus	4	Mixture (consequentialist, social-relational, legal precedent)	0
Lavi	2019	Google Scholar: 1 and 7	Rights / Moral	Design	Israel	3	Mixture (consequentialist, deontological)	0
Lee et al.	2019	ACM Digital Library: 7	Moral	Psychology / Other engineering	Netherlands	NA	NA	1
Leenes and Lucivero	2014	Google Scholar: 2	Rights	Law	Netherlands	NA	Legal precedent	71
Lender	2016	Google Scholar: 7	Moral	Other or unidentifiable	Unclear	4.5	Consequentialist	0
Levy	2009	Google Scholar: 1 and 5, Scopus: 1, and Web of Science: 1	Rights / Moral	Other or unidentifiable	United Kingdom	5	Social-relational	79
Levy	2012	Google Scholar: 1 and 5 and ACM Digital Library: 5	Rights / Moral	Other or unidentifiable	United Kingdom	4.5	Legal precedent	34
Levy	2016	Google Scholar: 1	Rights	Other or unidentifiable	United Kingdom	4.5	Legal precedent	10
Lima et al.	2019	Google Scholar: 1 and 2	Rights	Computer engineering or computer science	Korea	NA	NA	0
Lima et al.	2020	Google Scholar: 1, 2, and 5	Rights / Moral	Computer engineering or computer science	Korea	NA	NA	0

Author	Year	Source	Type	Discipline	Country	Score	Framework	Count
Loh	2019	Google Scholar: 1, 5, and 7	Rights / Moral	Philosophy or ethics	Austria	4.5	Other	0
Lopez-Mobilia	2011	Google Scholar: 5	Moral	Psychology	United States	NA	NA	0
Lupetti et al.	2019	Google Scholar: 1	Rights	Design	Netherlands	3.5	Social-relational	3
MacDorman and Cowley	2006	Google Scholar: 5	Moral	Other social sciences / Computer engineering or computer science	United States	4	Unclear	39
Mackenzie	2014	ACM Digital Library: 5	Moral	Law	United Kingdom	4.5	Deontological	9
Mackenzie	2016	Google Scholar: 6 and 7	Moral	Law	United Kingdom	4	Deontological	1
Mackenzie	2018	Scopus: 1 and Web of Science: 1	Rights	Law	United Kingdom	4.5	Deontological	5
Mackenzie	2020a	Google Scholar: 6	Moral	Law	United Kingdom	4	Other	0
Mackenzie	2020b	Google Scholar: 6, ACM Digital Library: 6 and 7, and Scopus: 6	Moral	Law	United Kingdom	4	Deontological	8
Magnani	2005	Google Scholar: 7	Moral	Philosophy or ethics	Itay	4.5	Deontological	1
Magnani	2007	Google Scholar: 7	Moral	Philosophy or ethics	Itay	4.5	Deontological	0
Malle	2016	Google Scholar: 1 and 5 and ACM Digital Library: 1 and 5	Rights / Moral	Cognitive science	United States	4	NA	78
Massaro and Norton	2018	Google Scholar: 4	Rights	Law	United States	2.5	Legal precedent	0
Massaro	2015	Google Scholar: 4	Rights	Law	United States	NA	Legal precedent	55
Mazarian	2019	Google Scholar: 4 and 5	Rights / Moral	Cognitive science	Iran	1.5	Unclear	0
McLaughlin and Rose	2018	Google Scholar: 1 and 7	Rights / Moral	Philosophy or ethics	United States	2.5	Mixture (deontological, consequentialist)	1
McNally and Inayatullah	1988	Google Scholar: 1 and 2, ScienceDirect: 1 and ScienceDirect: 2	Rights	Law	United States	4	Mixture (legal precedent, other)	72
Mehlman et al.	2017	Google Scholar: 2	Rights	Law	United States	4	NA	4
Michalski	2018	Google Scholar: 2	Rights	Law	United States	4	Legal precedent	9
Miles	1994	ScienceDirect: 4	Rights	Other social sciences	United Kingdom	NA	NA	3
Miller et al.	2015	Google Scholar: 7	Moral	Computer engineering or computer science	United States	4.5	Information Ethics	10

Author	Year	Database	Rights/Moral	Discipline	Country		Orientation	Citations
Miller	2015	Google Scholar: 3 and 7	Rights / Moral	Philosophy or ethics	United States	2	Deontological	14
Mosakas	2020	Google Scholar: 5 and 6 and 7 and Web of Science: 3 and 5	Rights / Moral	Philosophy or ethics	Lithuania	4	Mixture (consequentialist, deontological)	0
Nakada	2011	Google Scholar: 7	Moral	Other humanities / Other social sciences	Japan	NA	NA	0
Nakada	2012	Google Scholar: 2	Rights	Other humanities / Other social sciences	Japan	NA	NA	3
Navajas et al.	2019	ScienceDirect: 1	Rights	Cognitive science / Business	Argentina	NA	NA	4
Neely	2014	Google Scholar: 3, 5, and 7 and Scopus: 3 and 7	Rights / Moral	Philosophy or ethics	United States	4.5	Mixture (consequentialist, deontological)	24
Nijssen et al.	2019	Google Scholar: 5 and 6	Moral	Other social science	Netherlands	NA	NA	14
Nomura et al.	2018	Google Scholar: 6 and Scopus: 6	Moral	Communication or media	Japan	NA	NA	1
Nomura et al.	2019	Google Scholar: 5 and 6, ACM Digital Library: 5 and 6, and Scopus: 5	Moral	Communication or media	Japan	3	NA	1
Nyholm	2019	Google Scholar: 1 and 5	Rights / Moral	Philosophy or ethics	Netherlands	NA	NA	1
Obodiac	2012	Google Scholar: 2	Rights	Other humanities	United States	NA	NA	0
Olivera-La Rosa	2018	Google Scholar: 6 and ScienceDirect: 6 and 7	Moral	Psychology	Colombia	NA	NA	6
Pagallo	2010	Google Scholar: 7	Moral	Law	Italy	4.5	Mixture (legal precedent, Information Ethics)	11
Pagallo	2011	Google Scholar: 7 and ACM Digital Library: 7	Moral	Law	Italy	4.5	Mixture (legal precedent, Information Ethics)	22
Petersen	2007	Google Scholar: 1, ACM Digital Library: 1, Scopus: 1, and Web of Science: 1	Rights	Philosophy or ethics	United States	3	Mixture (consequentialist, virtue ethicist)	42
Petersen	2012	Google Scholar: 1 and 5 and ACM Digital Library: 5	Rights / Moral	Philosophy or ethics	United States	3	Mixture (consequentialist, deontological, virtue ethicist)	41

Piazza et al.	2014	Google Scholar: 6 and ScienceDirect: 5, 6, and 7	Moral	Psychology	United States	NA	NA	45
Powers	2013	Google Scholar: 7, Scopus: 7, and Web of Science: 7	Moral	Philosophy or ethics	United States	3	Unclear	22
Prescott	2017	Google Scholar: 7	Moral	Psychology / Robotics	United Kingdom	4	Unclear	18
Puaschunder	2019	Google Scholar: 1	Rights	Other social sciences	United States	NA	Unclear	11
Rademeyer	2017	Google Scholar: 2	Rights	Future studies	Australia	5	NA	0
Rainey	2016	ACM Digital Library: 1	Rights	Philosophy or ethics	United Kingdom	3.5	Mixture (virtue ethicist, deontological)	7
Redan	2014	Google Scholar: 2 and 5	Rights / Moral	Other or unidentifiable	Unclear	4.5	Unclear	1
Reiss	2020	Google Scholar: 5	Moral	Other social sciences	United Kingdom	4	NA	0
Richardson	2016	Google Scholar: 1, 3, and 5	Rights / Moral	Philosophy or ethics	United Kingdom	2	NA	60
Richardson	2019	Google Scholar: 3 - Kathrani, ACM Digital Library: 1, and 3	Rights	Philosophy or ethics	United Kingdom	2	Unclear	6
Risse	2019	Google Scholar: 5	Moral	Philosophy or ethics	United States	4	NA	0
Robertson	2014	Google Scholar: 1, Scopus: 1, and Web of Science: 1	Rights	Other social science / History	United States	NA	NA	62
Rodogno	2017	Google Scholar: 5 and 7, Scopus: 7, and Web of Science: 7	Moral	Other humanities	Denmark	2.5	Unclear	11
Russell	2009	ScienceDirect: 1, 2, and 4	Rights	Law	United States	4	Legal precedent	11
Sætra	2019	Google Scholar: 5 and 7	Moral	Political science	Norway	3	Unclear	2
San José et al.	2016	Google Scholar: 9	Suffering	Philosophy or ethics	Denmark	4	Mixture (consequentialist, deontological)	0
Sarathy et al.	2019	ACM Digital Library: 1	Rights	Computer engineering or computer science / Cognitive Science	United States	NA	NA	1
Schafer	2016	Google Scholar: 2 and 5	Rights / Moral	Law	United Kingdom	NA	NA	3
Scheessele	2018	Google Scholar: 7 and ACM Digital Library: 5 and 7	Moral	Computer engineering or computer science / Psychology	United States	3.5	Mixture (consequentialist, deontological)	2

Schmetkamp	2020	Google Scholar: 5 and 7, Scopus: 5, and Web of Science: 5	Moral	Philosophy or ethics	Switzerland	NA	Social-relational	0
Schwitzgebel and Garza	2015	Google Scholar: 5 and 7	Moral	Philosophy or ethics	United States	4	Mixture (deontological, consequentialist, virtue ethicist, social-relational)	28
Sheliazhenko	2019	Google Scholar: 1 and Scopus: 1	Rights	Law	Ukraine	5	Unclear	4
Sijie	2020	Google Scholar: 3	Rights	Law	China	NA	NA	0
Siponen	2004	ACM Digital Library: 5 and 7	Moral	Communication or media / Information technology	Finland	3	Mixture	49
Sittler	2018	Google Scholar: 10	Suffering	Other or unidentifiable	United Kingdom	4	Consequentialist	1
Smids	2020	Google Scholar: 1 and 6	Rights / Moral	Philosophy or ethics	Netherlands	4	Consequentialist	0
Sommer et al.	2019	Google Scholar: 5 and 6, ScienceDirect: 5 and 6, Scopus: 5 and 6, Web of Science: 5	Moral	Psychology	Australia	NA	NA	5
Sotala and Gloor	2017	Google Scholar: 8, 9, and 10, Scopus: 10, and Web of Science: 10	Suffering	Other or unidentifiable	Germany	4.5	Mixture	23
Sparrow	2004	Google Scholar: 5 and ACM Digital Library: 5	Moral	Philosophy or ethics	Australia	3	Mixture (consequentialist, deontological)	52
Sparrow	2012	Google Scholar: 1 and 5 and ACM Digital Library: 5	Rights / Moral	Philosophy or ethics	Australia	3.5	Mixture (consequentialist, deontological)	32
Sparrow	2020	Google Scholar: 5	Moral	Philosophy or ethics	Australia	4.5	Virtue ethicist	1
Spence	2012	ACM Digital Library: 5 and 7	Moral	Philosophy or ethics	Netherlands	4.5	Other	1
Spence et al.	2018	Google Scholar: 1, 2 and 7, ACM Digital Library: 1, 2, 5, and 7, and Scopus: 1 and 5	Rights / Moral	Communication or media / Robotics	United States	NA	NA	3
Spennemann	2007	ScienceDirect: 2	Rights	Other or unidentifiable	Australia	4	Consequentialist	21
Stapleton	2018	Google Scholar: 7	Moral	Philosophy or ethics	United States	3	Unclear	0

Author	Year	Database	Focus	Discipline	Country		Theory	Citations
Starmans and Friedman	2016	Google Scholar: 6 and ScienceDirect: 6 and 7	Moral	Psychology	United States	NA	NA	9
Sullins	2005	ACM Digital Library: 5	Moral	Philosophy or ethics	United States	4	Unclear	28
Sumantri	2019	Google Scholar: 1	Rights	Other or unidentifiable	Indonesia	NA	Legal precedent	1
Summers	2016	Google Scholar: 2	Rights	Philosophy or ethics	United States	NA	NA	0
Suzuki et al.	2015	Google Scholar: 5	Moral	Computer engineering or computer science	Japan	NA	NA	77
Swiderska and Küster	2018	Google Scholar: 7	Moral	Psychology	Poland	NA	NA	6
Swiderska and Küster	2020	Google Scholar: 7, Scopus: 7, and Web of Science: 7	Moral	Psychology	Poland	NA	NA	1
Taraban	2020	Google Scholar: 1, Scopus: 1, and Web of Science: 1	Rights	Psychology	United States	NA	NA	0
Tavani	2008	ACM Digital Library: 5 and 7	Moral	Philosophy or ethics	United States	NA	NA	49
Tavani	2018	Google Scholar: 1, 5, and 7, Scopus: 1, 5, and 7, and Web of Science: 1, 5, and 7	Rights / Moral	Philosophy or ethics	United States	4	Deontological	13
Theodorou	2020	Google Scholar: 7	Moral	Computer engineering or computer science	Sweden	3	Other	0
Toivakainen	2016	Google Scholar: 5 and 7 and ACM Digital Library: 5 and 7	Moral	Philosophy or ethics	Finland	NA	NA	3
Toivakainen	2018	Google Scholar: 1 and Scopus: 1	Rights	Philosophy or ethics	Finland	2	Other	0
Tollon	2019	Google Scholar: 5 and 7	Moral	Other humanities / Other social sciences	South Africa	4	Unclear	0
Tollon	2020	Google Scholar: 7, Scopus: 5 and 7 ,and Web of Science: 5 and 7	Moral	Philosophy or ethics	South Africa	4	Social-relational	0
Tomasik	2011	Google Scholar: 8	Suffering	Other or unidentifiable	Germany	5	Consequentialist	10
Tomasik	2013	Google Scholar: 8	Suffering	Other or unidentifiable	Germany	5	Consequentialist	0
Tomasik	2014	Google Scholar: 3, 6, and 8	Rights / Moral / Suffering	Other or unidentifiable	Germany	5	Consequentialist	8

Author	Year	Database	Category	Discipline	Country	Rating	Ethical framework	Citations
Tonkens	2012	Google Scholar: 7, ACM Digital Library: 7, and Scopus: 1	Rights / Moral	Philosophy or ethics	United States	NA	Virtue ethicist	22
Torrance	2005	Google Scholar: 5 and 7	Moral	Other social sciences	United Kingdom	4	Mixture (consequentialist, deontological)	5
Torrance	2006	Google Scholar: 5	Moral	Other social sciences	United Kingdom	4	Mixture (consequentialist, deontological)	3
Torrance	2008	Google Scholar: 5 and 7, ACM Digital Library: 5 and 7, and Scopus: 5	Moral	Cognitive science	United Kingdom	4	Mixture (consequentialist, deontological)	89
Torrance	2011	Google Scholar: 2	Rights	Other engineering / Computer engineering or computer science	United Kingdom	NA	NA	23
Torrance	2013	Google Scholar: 2, 6, and 6	Rights / Moral	Other engineering / Computer engineering or computer science	United Kingdom	4	Mixture (consequentialist, deontological)	16
Torrance	2014	Google Scholar: 6 and Scopus: 7	Moral	Other engineering / information technology	United Kingdom	4	Mixture (consequentialist, deontological)	19
Torres	2018	Google Scholar: 10, ScienceDirect: 10, Scopus: 10, and Web of Science: 10	Suffering	Other or unidentifiable	United States	4	NA	15
Torres	2020	Google Scholar: 9	Suffering	Philosophy or ethics	United States	4	Mixture (consequentialist, deontological)	0
Turchin	2019	Google Scholar: 9	Suffering	Other or unidentifiable	United States	4	NA	0
Turchin et al.	2019	Google Scholar: 9 and 10	Suffering	Other or unidentifiable	Russia	4	NA	5
Turner	2019	Google Scholar: 1 and 7	Rights / Moral	Law	United Kingdom	3.5	Mixture (consequentialist, virtue ethicist, deontological, legal perspective)	70
Tzafestas	2016	Google Scholar: 2	Rights	Other engineering	Greece	NA	NA	1
Umbrello and Sorgner	2019	Google Scholar: 10	Suffering	Philosophy or ethics	Italy	4	NA	0
Vadymovych	2017	Google Scholar: 1	Rights	Law	Ukraine	4.5	NA	3
Van den Berg	2011	Google Scholar: 2	Rights	Law	Netherlands	NA	Legal precedent	13

Author	Year	Database	Category	Discipline	Country	Score	Framework	Citations
Van den Hoven Van Genderen	2018	Google Scholar: 2	Rights	Law	Netherlands	3.5	Legal precedent	2
Vanman and Kappas	2019	Google Scholar: 5	Moral	Psychology	Australia	NA	NA	3
Vize	2011	Google Scholar: 2 and 5	Rights / Moral	Philosophy or ethics	Australia	4	Consequentialist	0
Voiculescu	2020	Google Scholar: 1 and 2	Rights	Other or unidentifiable	Unclear	NA	Legal precedent	0
Wallkötter et al.	2020	Google Scholar: 5, 6, and 7, ACM Digital Library: 5 and 7, and Scopus: 5	Moral	Information technology	Sweden	NA	NA	0
Wang and Krumhuber	2018	Google Scholar: 5 and 7	Moral	Psychology	United Kingdom	NA	NA	11
Ward et al.	2013	Google Scholar: 7	Moral	Psychology	United States	NA	NA	45
Wareham	2013	ACM Digital Library: 5	Moral	Medical or biology	Italy	4	Deontological	11
Warwick	2010	Google Scholar: 1, ACM Digital Library: 1, Scopus: 1, and Web of Science: 1	Rights	Other engineering	United Kingdom	4	NA	103
Warwick	2012	Google Scholar: 1 and 5 and ACM Digital Library: 5	Rights / Moral	Other engineering	United Kingdom	4	NA	14
Waser	2012	Google Scholar: 3	Rights	Other or unidentifiable	Unclear	4.5	Unclear	10
Wegloop and Vach	2020	Google Scholar: 9	Suffering	Other or unidentifiable	Germany	2.5	NA	0
Weng et al.	2009	Google Scholar: 1	Rights	Other or unidentifiable	China	NA	Legal precedent	93
Winsby	2013	Google Scholar: 5, 7, and 8	Moral / Suffering	Philosophy or ethics	Canada	4	Mixture (consequentialist, deontological)	2
Wortham	2018	Google Scholar: 7	Moral	Computer engineering or computer science	United Kingdom	NA	NA	6
Wright	2019	Google Scholar: 1 and 2	Rights	Law	United States	3.5	Legal precedent	0
Wu	2012	Google Scholar: 2	Rights	Law	United States	3.5	Legal precedent	138
Wurah	2017	Google Scholar: 1 and 2, Scopus: 2, and Web of Science: 2	Rights	Law	Canada	3	Legal precedent	5
Yampolskiy	2013	Google Scholar: 1 and 7, ACM Digital Library: 1, Scopus: 1, and Web of Science: 1	Rights / Moral	Computer engineering or computer science	United States	1	NA (focused on AI safety concerns)	97

Yampolskiy	2017	Google Scholar: 3 and 9 and Web of Science: 3	Rights / Suffering	Computer engineering or computer science	United States	4.5	NA	11
Yanke	2020	Google Scholar: 1	Rights	Philosophy or ethics	United States	4	Mixture (legal precedent, consequentialism)	0
Zenor	2018	Google Scholar: 1 and 4	Rights	Communication or media	United States	NA	Legal precedent	1
Ziesche and Yampolskiy	2018	Google Scholar: 8, 9, and 10	Suffering	Other engineering	Maldives	4	Consequentialist	3
Ziesche and Yampolskiy	2019	Google Scholar: 8 and 9	Suffering	Other engineering	Maldives	4	Consequentialist	2

Table 8: Discipline analysis

	Count and citations					Percentages of total		
Discipline (or, for the bottom three, search term category)	Items, counted	Citation count	Citation count (outlier excluded)	Average citation count	Average citation count (outlier excluded)	Items, counted	Citation count	Citation count (outlier excluded)
Business	3	17	17	6	6	1%	0%	0%
Cognitive science	10	300	300	30	30	3%	4%	5%
Communication or media	28	740	740	26	26	10%	9%	12%
Computer engineering or computer science	30	473	473	16	16	10%	6%	8%
Design	5	27	27	5	5	2%	0%	0%
English literature or language	3	0	0	0	0	1%	0%	0%
Future studies	2	3	3	2	2	1%	0%	0%
History	3	83	83	28	28	1%	1%	1%
Information technology	5	86	86	17	17	2%	1%	1%
Law	49	1002	1002	20	20	17%	12%	17%
Medical or biology	6	111	111	19	19	2%	1%	2%
Other engineering	12	200	200	17	17	4%	2%	3%
Other humanities	8	14	14	2	2	3%	0%	0%
Other social sciences	18	111	111	6	6	6%	1%	2%
Other or unidentifiable	32	471	471	15	15	11%	6%	8%
Philosophy or ethics	82	4614	2101	56	26	28%	54%	35%

Political science	3	13	13	4	4	1%	0%	0%
Psychology	20	495	495	25	25	7%	6%	8%
Robotics	4	23	23	6	6	1%	0%	0%
Total	**294**	**8505**	**5992**	**29**	**20**	**100%**	**100%**	**100%**
"Rights" search terms	146	2938	2938	20	20	50%	35%	49%
"Moral" search terms	171	4071	4071	24	24	58%	48%	68%
"Suffering" search terms	25	2700	187	108	8	9%	32%	3%

Table 9: Framework analysis

	Count and citations					Percentages of total		
Framework	**Items, counted**	**Citation count**	**Citation count (outlier excluded)**	**Average citation count**	**Average citation count (outlier excluded)**	**Items, counted**	**Citation count**	**Citation count (outlier excluded)**
Consequentialist	16	2612	99	163	7	5%	31%	2%
Deontological	15	213	213	14	14	5%	3%	4%
Information Ethics	5	1019	1019	204	204	2%	12%	17%
Legal precedent	34	906	906	27	27	12%	11%	15%
Mixture	52	892	892	17	17	18%	10%	15%
NA	103	1641	1641	16	16	35%	19%	27%
Other	15	311	311	21	21	5%	4%	5%
Social-relational	23	606	606	26	26	8%	7%	10%
Unclear	26	277	277	11	11	9%	3%	5%
Virtue ethicist	5	28	28	6	6	2%	0%	0%
Total	**294**	**8505**	**5992**	**29**	**20**	**100%**	**100%**	**100%**

Table 10: Country analysis

	Count and citations					Percentages of total		
Country	**Items, counted**	**Citation count**	**Citation count (outlier excluded)**	**Average citation count**	**Average citation count (outlier excluded)**	**Items, counted**	**Citation count**	**Citation count (outlier excluded)**
Argentina	1	4	4	4	4	0%	0%	0%
Australia	15	85	85	6	6	5%	1%	1%
Austria	3	9	9	3	3	1%	0%	0%
Brazil	1	0	0	0	0	0%	0%	0%
Canada	4	20	20	5	5	1%	0%	0%
China	5	99	99	20	20	2%	1%	2%
Colombia	1	6	6	6	6	0%	0%	0%
Croatia	1	0	0	0	0	0%	0%	0%
Cyprus	1	0	0	0	0	0%	0%	0%
Czecia	1	0	0	0	0	0%	0%	0%
Denmark	6	47	47	8	8	2%	1%	1%
Finland	5	64	64	13	13	2%	1%	1%
France	1	0	0	0	0	0%	0%	0%
Germany	13	76	76	6	6	4%	1%	1%

Greece	1	1	1	1	1	0%	0%	0%
Indonesia	1	1	1	1	1	0%	0%	0%
Iran	2	0	0	0	0	1%	0%	0%
Ireland	2	17	17	9	9	1%	0%	0%
Israel	2	26	26	13	13	1%	0%	0%
Italy	7	472	472	67	67	2%	6%	8%
Japan	6	88	88	15	15	2%	1%	1%
Korea	2	0	0	0	0	1%	0%	0%
Kuwait	1	3	3	3	3	0%	0%	0%
Lithuania	4	49	49	12	12	1%	1%	1%
Malaysia	1	0	0	0	0	0%	0%	0%
Maldives	2	5	5	3	3	1%	0%	0%
Malta	1	0	0	0	0	0%	0%	0%
Netherlands	21	524	524	25	25	7%	6%	9%
New Zealand	1	0	0	0	0	0%	0%	0%
Norway	1	2	2	2	2	0%	0%	0%
Poland	3	8	8	3	3	1%	0%	0%
Russia	2	5	5	3	3	1%	0%	0%
Singapore	1	0	0	0	0	0%	0%	0%
Slovakia	1	1	1	1	1	0%	0%	0%
South Africa	3	0	0	0	0	1%	0%	0%
Spain	3	10	10	3	3	1%	0%	0%
Sweden	3	0	0	0	0	1%	0%	0%
Switzerland	4	5	5	1	1	1%	0%	0%
Taiwan	1	3	3	3	3	0%	0%	0%
Ukraine	2	7	7	4	4	1%	0%	0%
Unclear	5	11	11	2	2	2%	0%	0%
United Kingdom	44	4366	1853	99	43	15%	51%	31%
United States	107	2453	2453	23	23	36%	29%	41%
Total	**294**	**8505**	**5992**	**29**	**20**	**100%**	**100%**	**100%**

Table 11: Dates analysis

Date	Publications that year	Cumulative total of publications
1988	1	1
1989	0	1
1990	0	1
1991	0	1
1992	0	1
1993	0	1
1994	3	4
1995	0	4
1996	1	5
1997	0	5
1998	0	5
1999	1	6
2000	0	6
2001	2	8

2002	1	9
2003	2	11
2004	3	14
2005	6	20
2006	4	24
2007	5	29
2008	6	35
2009	5	40
2010	6	46
2011	9	55
2012	17	72
2013	13	85
2014	14	99
2015	12	111
2016	27	138
2017	17	155
2018	40	195
2019	50	245
2020	49	294

Table 12: Journals and publication

Journal or book (if applicable)	Number of identified items	Percentage of all items
Chapter in a book	38	13%
Entry in a conference report	36	13%
NA	35	12%
Ethics and Information Technology	25	9%
AI and Society	13	4%
Philosophy and Technology	7	2%
Science and Engineering Ethics	6	2%
Self-authored book	6	2%
ACM SIGCAS Computers and Society	5	2%
arXiv preprint	4	1%
Computer Law and Security Review	4	1%
Futures	4	1%
Cognition	3	1%
International Journal of Social Robotics	3	1%
Law, Innovation and Technology	3	1%
Artificial Intelligence and Law	2	1%
IEEE Technology and Society Magazine	2	1%
Journal of Evolution and Technology	2	1%
Journal of Experimental and Theoretical Artificial Intelligence	2	1%
Journal of Futures Studies	2	1%

Journal of Information, Communication and Ethics in Society	2	1%
Minds and Machines	2	1%
Paladyn, Journal of Behavioral Robotics	2	1%
Philosophies	2	1%
ACM Transactions on Human-Robot Interaction (THRI)	1	0%
Arkansas Law Review	1	0%
Artificial Intelligence: Reflections in Philosophy, Theology, and the Social Sciences	1	0%
Artnodes	1	0%
Autism Research	1	0%
Big Data and Cognitive Computing	1	0%
BioLaw Journal-Rivista di BioDiritto	1	0%
Cambridge Quarterly of Healthcare Ethics	1	0%
Canberra Law Review	1	0%
Cardozo Arts and Entertainment Law Journal	1	0%
Case Research Paper Series in Legal Studies	1	0%
Cognitive Science	1	0%
Communications of the ACM	1	0%
Connection Science	1	0%
Critical Asian Studies	1	0%
Current Biology	1	0%
Dialogue: The Interdisciplinary Journal of Popular Culture and Pedagogy	1	0%
Early Education and Development	1	0%
Educational Insights	1	0%
Environmental Ethics	1	0%
Ethical Theory and Moral Practice	1	0%
Ethics Quarterly	1	0%
European Journal of Law and Political Sciences	1	0%
Frontiers in Psychology	1	0%
Game Studies	1	0%
Harvard Journal of Law and Technology	1	0%
Human Rights Quarterly	1	0%
Human Rights Review	1	0%
i-lex Scienze Giuridiche, Scienze Cognitive e Intelligenza Artificiale Rivista	1	0%
Idea. Studia nad strukturą i rozwojem pojęć filozoficznych	1	0%
Informatica	1	0%
Information	1	0%
Interaction Studies	1	0%
International and Comparative Law Quarterly	1	0%
International Journal of Psychology	1	0%
International Review of Information Ethics	1	0%

Iride	1	0%
Islam and Civilisational Renewal ICR Journal	1	0%
Journal of Experimental Child Psychology	1	0%
Journal of Future Robot Life Preprint	1	0%
Journal of Future Studies	1	0%
Journal of Health, Social and Environmental Issues	1	0%
Journal of Information, Communication and Ethics in Society	1	0%
Journal of Medicine and Philosophy	1	0%
Journal of Moral Education	1	0%
Journal of Sociotechnical Critique	1	0%
Journal of Virtual Worlds Research	1	0%
Kairos: Journal of Philosophy and Science	1	0%
Knowledge Futures: Interdisciplinary	1	0%
Kritikos	1	0%
Lentera Hukum	1	0%
Machine Medical Ethics	1	0%
Midwest Studies in Philosophy	1	0%
NeuroImage	1	0%
New Ideas in Psychology	1	0%
New Media and Society	1	0%
New Waves in Philosophy of Technology	1	0%
Nordic Journal of Commercial Law	1	0%
Northwestern University Law Review	1	0%
On the Cognitive, Ethical, and Scientific Dimensions of Artificial Intelligence	1	0%
Pandora's Box - The journal of the Justice and the Law Society of the University of Queensland	1	0%
Perception	1	0%
Philosophical Investigations	1	0%
Postmodern Culture	1	0%
Procedia Computer Science	1	0%
Proceedings of the International Association for Computing and Philosophy	1	0%
Psychological Ownership and Consumer Behavior	1	0%
Psychological Science	1	0%
Review of Philosophy and Psychology	1	0%
Revista de Filosofia Aurora	1	0%
Robotics	1	0%
Savannah Law Review	1	0%
Science Fiction Film and Television	1	0%
Scientia Moralitas- International Journal of Multidisciplinary Research	1	0%
Scientific Reports	1	0%

Social and Personality Psychology Compass	1	0%
Social Cognition	1	0%
Social Epistemology	1	0%
South African Journal of Philosophy	1	0%
Studies in History and Philosophy of Science Part C: Studies in History and Philosophy of Biological and Biomedical Sciences	1	0%
The Frontiers of Society, Science and Technology	1	0%
The Journal of Philosophical-Theological Research	1	0%
Topoi	1	0%
Trends in Cognitive Sciences	1	0%
Universe, Human Immortality and Future Human Evaluation	1	0%
University of Pennsylvania Law Review	1	0%
Utah Law Review	1	0%
Virginia Journal of Law and Technology Association	1	0%
Writing Identity: The Construction of National Identity in American Literature	1	0%