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Between Speculation and Regulation: Science Fiction as a Tool for Legal Inquiry

ABSTRACT

This article develops a conceptual framework for using science fiction as a tool for anticipatory legal analysis of emerging technologies. As technologies such as artificial intelligence, gene editing, advanced reproductive systems, and autonomous weaponry advance faster than conventional legal methodologies can accommodate, legal scholarship requires tools capable of proactive rather than reactive regulatory thinking. This article argues that science fiction, approached on its own literary terms, provides precisely this. The argument proceeds in three parts. **Part I** establishes that legal theory and science fiction share a long tradition of speculative thinking, showing how both fields have relied on hypothetical reasoning to work through the social and normative implications of technological change. **Part II** articulates a working account of science fiction for legal inquiry. It defines the genre through its core elements: the novum, cognitive estrangement, and paradigm shift. It then traces the evolution of science fiction in an era where the boundary between speculation and technological reality is increasingly compressed. Finally, it challenges two enduring misconceptions that continue to hinder legal engagement with the genre — the assumption that science fiction is primarily predictive, and the assumption that it is inherently dystopian. **Part III** introduces the category of "realist science fiction": a sub-genre set within our recognisable social world, built around a plausible technological development whose legal and ethical consequences the narrative then explores. This sub-genre is particularly well suited to anticipatory legal analysis, because it projects emerging technologies to the point at which their legal implications become visible — allowing scholars to identify regulatory gaps, trace the effects of technological change, and consider appropriate legal responses before the moment for meaningful intervention has passed. The article concludes with practical guidance for incorporating realist science fiction into legal research.

KEYWORDS

law and literature; science fiction; emerging technologies; anticipatory legal analysis; realist science fiction; speculative thinking; legal methodology; artificial intelligence; ectogenesis; novum; cognitive estrangement; technology regulation; legal imagination; legal method.

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"But what examples! The world of the philosopher is filled with people spores, child missile launchers, Martians, talking robots, talking dogs, kittens, chimps, jig [s]aw cells that form human beings, transparent wombs, and cool hands – everything in fact but fetuses growing in wombs and infants cradled in parents' arm […]. Philosophers have moved into the world of fantasy in the same way and with the same verve that social scientists moved into the world of quantifiable facts".[2]

Introduction

In the face of unprecedented technological progress and the accompanying regulatory challenges, this article proposes an approach to legal inquiry through science fiction. As transformative technologies reshape societal norms, traditional legal methodologies often fall short in addressing the dynamic challenges of the 21st century.[3] In contemplating our current era, it is hard to conceive of a time in which there was a greater symbiosis between humans and machines; think of contemporary headlines and titles heralding "posthumanism"[4], "artificial wombs"[5], "human enhancements"[6], "trustworthy artificial intelligence AI"[7], "cyborg soldiers"[8], to name but a few. While the law is not traditionally animated by questions investigating unimagined technologies such as complex human-machine dilemmas, science fiction, a genre of speculative fiction, often populates narratives grounded in such technologies.[9] Considering both the growing need in law for speculative tools to address escalating technological

[2] Philip Abbott, "Philosophers and the Abortion Question," *Political Theory* 6.3 (1978): 313-335, 335.
[3] Alina Tugend, "Experts on A.I. Agree That It Needs Regulation. That's the Easy Part. Participants in a Task Force on Artificial Intelligence at the Dealbook Summit Grappled with How to Balance Oversight of the Technology With Innovation," *The New York Times*, 6 December 2023. Available at: https://www.nytimes.com/2023/12/06/business/dealbook/artificial-intelligence-regulation.html, accessed 17 January 2024.
[4] Emily Jones, *Feminist Theory and International Law: Posthuman Perspectives* (Abingdon: Taylor & Francis, 2023).
[5] Victoria Hooton Romanis and Chloe Elizabeth, "Artificial Womb Technology, Pregnancy, and EU Employment Rights," *Journal of Law and the Biosciences* 9.1 (2022).
[6] Michael Haiden, "Regulating Human Enhancement Technologies: How to Escape the Problem of Anarchy?," *Journal of Ethics and Emerging Technologies* 31.1 (2022): 1-16.
[7] Abhishek Kumar et al., "Trustworthy AI in the Age of Pervasive Computing and Big Data" (paper presented at the IEEE International Conference on Pervasive Computing and Communications Workshops, 2020); Ashly Vance, "Merely Human? That's So Yesterday," *The New York Times*, 12 June 2010. Available at: https://www.nytimes.com/2010/06/13/business/13sing.html, accessed 17 January 2024.
[8] Noam Lubell and Katya Al-Khateeb, "Cyborg Soldiers: International Law and Military Brain-Computer Interfaces," in Laura A. Dickinson and W. Edward Berg (eds), Big Data and Armed Conflict: Legal Issues Above and Below the Armed Conflict Threshold (Oxford: Oxford University Press, 2024), 249-272.
[9] Anfeng Sheng and Fei Wang, "Falling in Love with Machine: Emotive Potentials Between Human and Robots in Science Fiction and Reality," *Neohelicon* 49.2 (2022); George Bass, "A 1993 Dystopian Novel Imagined the World in 2024. It's eerily Accurate," *The Washington Post*, 13 January 2024. Available at: https://www.washingtonpost.com/history/2024/01/13/octavia-butler-2024-parable-sower/, accessed 13 January 2024; Margaret Atwood, "I Invented Gilead. The Supreme Court is Making It Real," *The Atlantic*, 13 May 2022. Available at: https://www.theatlantic.com/ideas/archive/2022/05/supreme-court-roe-handmaids-tale-abortion-margaret-atwood/629833/, accessed 28 February 2025.

challenges and the literary foundations of science fiction as a genre with unbound freedom to imagine the world in new ways,[10] this article builds on the premise that science fiction texts are extended thought experiments and develops an interdisciplinary conceptual framework for engaging science fiction in legal analysis of emerging technologies. By establishing this foundation, the article aims to equip legal scholars and practitioners with the tools to use science fiction as a catalyst for anticipatory legal inquiry — one capable of influencing the development and configuration of emerging technologies ensuring their alignment with appropriate laws.

The field of *law and literature* is well established and continues to flourish. Recent years have seen a growing scholarly engagement with the specific intersection of law and science fiction. This increased attention is also marked by the evolution of science fiction itself, which has increasingly centred on technologies that blur the boundary between speculation and reality, including artificial intelligence, gene editing, autonomous systems, and human enhancement. What were once distant or abstract imaginings now correspond to imminent or ongoing technological developments, rendering science fiction an increasingly relevant resource for legal scholarship. Some works have examined how science fiction engages questions of technology, posthumanism, embodiment, and law, with sustained analyses of legality in science fiction spanning novels, film, and television series to demonstrate how such narratives engage with legal frameworks in technologically transformed societies.[11] Other works have explored law's relationship to

[10] Kieran Tranter, "The Speculative Jurisdiction," *Griffith Law Review* 20.4 (2011): 817-850, 817. As Tranter notes, when "law confronts technology, science fiction is its speculative jurisdiction [where] law could engage more adequately with the complexities and contingencies of technological change." Similarly, "[n]ew socio-literary techniques, inspired by science fiction, could offer significant contributions to the governance of new and emerging technologies by improving the capacity to reflexively assess the social dynamics of socio-technical systems." Clark A. Miller and Ira Bennett, "Thinking Longer Term About Technology: Is There Value in Science Fiction-Inspired Approaches to Constructing Futures?," *Science and Public Policy* 35.8 (2008): 597-606, 597. In discussing speculation in law as "legal foresighting," scholars consider "the evolution and uses of fore-sighting techniques in the context of technological innovation," arguing that legal foresighting "should help us create pathways into the unknown, and part of that creation may mean (or demand) a fundamental re-visioning of the legal setting itself, its instruments, institutions, and regulatory or governance mechanisms." Graeme Laurie, Shawn H.E. Harmon, and Fabiana Arzuaga, "Foresighting Futures: Law, New Technologies, and the Challenges of Regulating for Uncertainty," *Law, Innovation and Technology* 4.1 (2012): 1-33, 3. In Jorge L. Contreras, "Science Fiction and the Law: A New Wigmorian Bibliography," *Harvard Journal of Sports & Entertainment Law* 13 (2022): 65-124, 65, Contreras argues that "[w]hen confronting novel legal issues arising due to rapid technological change, these speculative accounts [of science fiction] help to inform the background intuition of judges, legislators and citizens". In Travis Mitchell, "Making space: Law and Science Fiction," *Law and Literature* 23 (2011): 241-261, 248, Mitchell says "that science fiction both highlights (or even fuels) existing cultural concerns and creates a space in which to consider the implications of new technologies". For more, see Daxton R. Stewart, *Media Law Through Science Fiction: Do Androids Dream of Electric Free Speech?* (New York: Routledge, 2019); and Casey Fiesler, "Innovating Like an Optimist, Preparing Like a Pessimist: Ethical Speculation and the Legal Imagination," *Colorado Technology Law Journal* 19.1 (2021): 1-18.

[11] Recent scholarship in law and the humanities has increasingly examined how technological imaginaries—often articulated through science fiction—shape legal understandings of posthumanism, agency, and regulation. For example, in Daniela Carpi, *Law and Culture in the Age of Technology* (Berlin: De Gruyter, 2022), Carpi situates legal questions raised by artificial intelligence, posthuman identity, and technological mediation within literary and

science fiction more broadly, highlighting how speculative narratives surface foundational legal questions concerning personhood, agency, and the limits of legal subjectivity.[12] Taken together, these contributions attest to the richness and growing maturity of this interdisciplinary field.[13] Despite these important advances, there remains a need for greater conceptual clarity regarding how legal scholars might engage science fiction texts in a systematic and methodologically explicit manner. Much of the existing literature compellingly illustrates that science fiction raises legally salient questions, but it often varies in its literary assumptions, generic focus, and analytical strategies. This leaves open questions concerning which forms of science fiction are most conducive to sustained legal inquiry and how such texts might be approached in a way that supports rigorous legal analysis rather than impressionistic analogy. This article therefore introduces the category of "realist science fiction" and argues that this subset of the genre is particularly valuable for anticipatory legal inquiry. Realist science fiction is characterised by its close alignment with existing social, technological, and institutional realities as it extrapolates emerging technologies to points at which their legal implications become visible. Rather than depicting distant futures or radically unfamiliar worlds, realist science fiction situates technological change within recognisable legal and social frameworks, thereby allowing legal issues to manifest in concrete and analytically tractable ways. Such texts offer legal scholars a means of examining how current regulatory assumptions might operate—or fail—under plausible technological extensions of the present.

The article proceeds in three parts. **Part I**, "A Philosophical Tradition: Speculative Thinking in Legal Theory and Science Fiction," demonstrates how law and science fiction are intertwined through the philosophical tradition of speculative thinking, showing how legal scholars and authors work with the same challenges and questions about human life and tend to use hypothetical examples to represent and configure the possible future consequences of emerging technologies. **Part II**, "Beyond Popular Assumptions and towards Understanding Science Fiction for Legal Enquiry," provides a working understanding of science

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cinematic narratives, showing how cultural texts anticipate and interrogate the ethical and juridical challenges posed by emerging technologies. In Heather D. Humann, "The Embodiment of Law: Altered Carbon and Six Wakes," *Pólemos* 15.1 (2021): 37-47; Humann uses the speculative worlds of *Altered Carbon* and *Six Wakes* to explore how law's assumptions about bodies, identity, and responsibility are challenged when technology alters or detaches the human body — showing how science fiction can illuminate foundational legal concepts.

[12] For example, in Kieran Tranter, *Living in Technical Legality: Science Fiction and Law as Technology* (Edinburgh: Edinburgh University Press, 2018); Tranter provides sustained readings of texts including the novels of Frank Herbert and Octavia E. Butler and television series such as *Battlestar Galactica* and *Doctor Who*.

[13] It is worth mentioning that, in recent decades, there is a notable increase in demand for interdisciplinarity when regulating emerging technologies. Several scholars have called for multi-stakeholder combined with interdisciplinary approaches to regulation and referred to the usefulness of science fiction and speculation. For example, "[c]yberlaw today is a deeply interdisciplinary enterprise, full of meaningful collaboration across a wide variety of training." Ryan Calo, "Robotics and the Lessons of Cyberlaw," *California Law Review* 103.3 (2015): 513- 564, 560. Similarly, in Gregory N. Mandel, "Regulating Emerging Technologies," in Roger Brownsword, Eloise Scotford, and Karen Yeung (eds), *Law, Innovation and Technology* (Oxford: Oxford University Press, 2009): 75-92,

fiction for legal inquiry in three components: first, it identifies the genre's essential elements (the novum, cognitive estrangement, and paradigm shift); second, it traces how science fiction has evolved to engage with technologies that increasingly blur boundaries between speculation and reality making the genre ever more relevant to urgent legal concerns; and third, it dispels common misconceptions that might hinder legal scholars from engaging with the genre. **Part III**, "Realist Science Fiction for Legal Inquiry," introduces the category of "realist science fiction," demonstrating how texts that combine realistic settings with speculative technological elements prove highly valuable for legal inquiry. Such narratives project technologies to points where legal issues manifest clearly within recognizable social and legal frameworks, enabling anticipatory legal analysis. this part also provides both textual demonstrations and methodological guidance for engaging with this category.

Part I: Speculative Thinking in Legal Theory and Science Fiction

In contemplating speculative thinking in legal theory, it is important to recognize the rich tradition of imaginative exploration that permeates legal philosophical discourse. It might seem like mere flights of fancy, but it is, in fact, integral to the very essence of practical reason. Speculative reason or asking "what if?" questions, as rooted in the Socratic tradition, is a methodological instrument that enhances philosophical inquiry.[14] To reason in a "speculative and a creative way" is also a class of skeptical technique famously attributed to Descartes.[15] Speculative reasoning develops as a thought experiment to extract insights from "hypothetical" scenarios to facilitate the "making a case" in order to explore possibilities as a means to construct persuasive arguments.[16] This is why within law and ethics, speculative reasoning assumes a prominent role as a tool to tease out the implications and limits of various positions.[17] Legal theory, for instance, commonly employs hypotheticals to explore and illustrate intricate legal concepts and principles. Consider scenarios like "the trolley problem",[18] which delves into moral dilemmas, or "the stolen medication", a hypothetical that addresses questions of ownership, possession, and property rights.[19] In tort law, the "negligent driver" scenario elucidates the elements of the duty of care and negligence, while criminal law contemplates the "defendant's dilemma" to explore the nuances of mens rea and actus reus.[20]

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[14] John McMillan, *The Methods of Bioethics: An Essay in Meta-Bioethics* (Oxford: Oxford University Press, 2018), 128.
[15] *Ibid.*, 92.
[16] *Ibid.*, 128.
[17] *Ibid.*
[18] Stephen S. Wu, "Autonomous Vehicles, Trolley Problems, and the Law," *Ethics and Information Technology* 22.1 (2020): 1-13.
[19] Helmut Weber, "The 'But For' Test and Other Devices—The Role of Hypothetical Events in the Law," *Historical Social Research* 34.2 (2009): 118-128.
[20] Leslie J. Mlakar, "Criminal Law: Evidence: Use of a Hypothetical Question," *Marquette Law Review* 52.4 (1969): 590-597.

In wills and estates law, the "lost will" hypothetical addresses the complexities of the burden of proof, rules of construction, and the admissibility of evidence.[21] Similarly, the "case of the speluncean explorers" serves as a legal thought experiment to explore diverse theories of statutory interpretation,[22] while the "ship of theseus" raises questions about legal notions of identity.[23] The "runaway self-driving car" scenario sparks discussions on liability, programming ethics, and car manufacturers' responsibilities.[24] These speculative scenarios are not merely intellectual exercises; they are tools through which legal scholars and practitioners engage with the intricate details of real-world cases. Prominent philosophers too have anchored their theories in speculative scenarios, like John Rawls's "veil of ignorance"[25], Robert Nozick's "the experience machine"[26], and Derek Parfit's "repugnant conclusion"[27]. These theories exemplify how formulating hypotheses, even in the context of seemingly far-reaching scenarios, is a powerful mechanism for legal scholars and practitioners to grapple with the complexities necessary for legal thinking.

Not only is the use of hypotheticals integral to the notion of "coherence" in legal theory, but it also plays a significant role during case deliberations.[28] They offer an imaginative framework for unraveling the nuanced connections between legal principles and practical resolutions, shedding light on how specific considerations may carry varying weights across diverse contexts.[29] To illustrate this, we can revisit 1973 when legal scholars grappled with the concept of "ectogenesis" in response to the landmark *Roe v. Wade* decision by the United States Supreme Court.[30] This decision, affirming a woman's right to privacy and prohibiting the coercion of pregnancy, inspired speculation among scholars about the potential of ectogenesis to reconcile conflicting interests. In this hypothetical scenario, scholars proposed preserving the right to privacy by extracting an unwanted fetus, terminating the pregnancy, and simultaneously addressing the state's interest in fetal life through implantation in an artificial womb.[31] This hypothetical

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[21] Jane B. Baron, "Irresolute Testators, Clear and Convincing Wills Law," *Washington and Lee Law Review* 73.1 (2016): 1-75.
[22] Lon L. Fuller, "The Case of the Speluncean Explorers," *Harvard Law Review* 62.4 (1949): 616-645.
[23] Matthew T. Bodie, "Trademark's 'Ship of Theseus' Problem," *Southern California Law Review* 95 (2021): 27-49.
[24] Sophia H. Duffy and Jamie Patrick Hopkins, "Sit, Stay, Drive: The Future of Autonomous Car Liability," *Science and Technology Law Review* 16.3 (2014): 101-123.
[25] John Rawls, *A Theory of Justice: Revised Edition* (Cambridge, MA: Harvard University Press, 1999).
[26] Robert Nozick, *Anarchy, State, and Utopia* (New York: Basic Books, 2013), 44.
[27] Derek Parfit, "Can We Avoid the Repugnant Conclusion?," *Theoria* 82.2 (2016): 110-127.
[28] S.L. Hurley, "Coherence, Hypothetical Cases, and Precedent," *Oxford Journal of Legal Studies* 10.2 (1990): 222-223.
[29] *Ibid.*
[30] *Roe v. Wade*, 410 U.S. 113 (1973).
[31] Kevin Abel, "The Legal Implications of Ectogenetic Research," *Tulsa Law Journal* 10.2 (1974): 243-255; Mark A. Goldstein, "Choice Rights and Abortion: the Begetting Choice Right and State Obstacles to Choice in Light of Artificial Womb Technology," *Southern California Law Review* 51.5 (1978): 877-921; Robert J. Favole, "Artificial Gestation: New Meaning for the Right to Terminate Pregnancy," *Arizona Law Review* 21.3 (1979):755-776.

exercise not only critically evaluated the decision but also underscored its vulnerability, particularly in rooting abortion rights in the right to privacy amid potential advancements like artificial wombs.

Today, as ectogenesis transitions from a hypothetical reproductive concept to an impending reality with its first human trial on the horizon,[32] the legal imagination faces a new frontier.[33] Given the absence of historical experience with ectogenesis, the law encounters challenges in grappling with the implications of this emerging technology. While constructing and testing hypotheses unveils nuanced dynamics within various facets of the law, addressing unprecedented technological advances proves daunting. The law, on its own, may find it challenging to extend a hypothetical thought experiment to a meaningful degree for a comprehensive and coherent perspective guiding jurisprudential discourse. This prompts contemplation about the potential value of consulting science fiction texts that explore such matters and whether realist science fiction texts can effectively bring such hypotheses to life.[34]

Apprehension over the future of technological development is not a concern restricted to today's world or to one discipline. Legal philosophers, scientists, and authors work with the same challenges and questions about human life and tend to use hypothetical examples to represent and configure the possible future consequences of scientific research. The novelist Isaac Asimov, for example, captured this tension in his writings,[35] and noted in the context of industrial revolution in 1988 that "the saddest aspect of life right now is that science gathers knowledge faster than society gathers wisdom".[36] Not surprising that legal scholars and practitioners too in 1988 shared the same anxiety about whether "justice can keep pace with the science".[37] For example, Gary M. Hoffman and Geoffrey M. Karny illustrated this anxiety by discussing the challenges faced in their practice; observing how intellectual property laws are being stretched to accommodate creations and technologies never before contemplated, and how infringement suits exploit "the current law's ambiguities".[38] They mentioned several challenges in patent law related to inventions such as hormones (insulin), genetic design, and software, which highlighted the inadequacy of patent laws established in 1790 to regulate such emerging technologies effectively. For instance, in *Diamond v*

[32] Claire Horn, "Will New Tech End the Need for Human Pregnancy?," *The Walrus*, 1 December 2023. Available at: https://thewalrus.ca/will-new-tech-end-the-need-for-human-pregnancy/, accessed 17 January 2024.
[33] Elizabeth Chloe Romanis, "Is 'viability' viable? Abortion, conceptual confusion and the law in England and Wales and the United States," *Journal of Law and the Biosciences* 7.1 (2020): 2-3.
[34] As you will see in Part III.
[35] For example, in Isaac Asimov, *I, Robot* (Dennis Dobson, 1950).
[36] Isaac Asimov and Jason A. Shulman (eds), *Isaac Asimov's Book of Science and Nature Quotations* (New York: Weidenfeld & Nicolson, 1988), 281.
[37] Gary M. Hoffman and Geoffrey M. Karny, "Can Justice Keep Pace with Science?," *European Intellectual Property Review* 10.12 (1988): 355-358, 355.
[38] *Ibid.*

Chakrabarty (1980), although the invention of "Pseudomonas bacterium" met the legal requirements for obtaining a patent, the US Supreme Court denied a patent solely because "patentable subject-matter includes 'anything under the sun that is made by man'"—plants and animals were considered "products of nature" and therefore not patentable.[39] Another example is how, in regulating "software", courts struggled for 10 years to articulate a workable rule for drawing the fine line between "expression and idea".[40] While these were troubles in law, Asimov tried to draw attention to the value of science fiction:

> [s]cience fiction writers foresee the inevitable, and although problems and catastrophes may be inevitable, solutions are not. The best way to defeat a catastrophe is to take action to prevent it long before it happens […] to do that one must foresee the catastrophe in time, but who listens to those who do the foreseeing? "Escape literature" says the world and turns away.[41]

His reflection on the role of science fiction writers as visionaries, foreseeing potential problems and offering solutions, prompts us to perceive science fiction as a space to exercise legal thought proactively. One can easily discern the relationship science fiction has to reality by examining the impact of science fiction (and fantasy) literature in language. Consider the fact that many of the words we use for new technology originated in this body of literature. For example, Albert Robida introduced the word "android" in his 1890 novel *The Electric Life*,[42] while H.G. Wells was the first to introduce "time machine" in his 1895 classic *The Time Machine*.[43] Czech writer Karel Čapek coined "robot" in his 1920 play *R.U.R. (Rossum's Universal Robots)*,[44] E.E. Smith brought us "deep space" and "pressure suit" in 1934,[45] and Isaac Asimov introduced "robotics" in his 1941 short story "Liar".[46] "Genetic engineering" first appeared in Jack Williamson's 1951 novel *Dragon's Island*.[47] Jack Binder's use of "zero-gravity" in 1938 referred to the gravityless state at the Earth's core, while Arthur C. Clarke popularized "zero-g" in his 1952 novel *Islands in the Sky*.[48] David Gerrold coined "computer virus" in his 1972 novel *When HARLIE Was One*,[49] and William Gibson introduced "cyberspace" in his 1982 short story "Burning Chrome".[50] Science fiction tells stories for us, fast-forwarding technologies being developed to the point where the dream of that technology becomes real or quasi-real. Think also of Aldous Huxley's *Brave New World* (1932),[51] William Gibson's *Neuromancer*

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[39] *Ibid.*
[40] *Ibid.*, 357.
[41] Isaac Asimov, *Asimov on Science Fiction* (New York: Doubleday, 1981), 95.
[42] Albert Robida, *The Electric Life* (Paris: La Librairie Illustrée, 1890).
[43] H.G. Wells, *The Time Machine* (London: William Heinemann, 1895).
[44] Karel Čapek, *R.U.R. (Rossum's Universal Robots)* (Prague: Aventinum, 1920).
[45] Alison Flood, "Fiction Beats Science in the Space Race for Fresh Phrases," *The Guardian*, 7 April 2009. Available at: https://www.theguardian.com/books/2009/apr/07/science-fiction-new-phrases, accessed 20 February 2024.
[46] Isaac Asimov, "Liar," *Astounding Science Fiction*, May 1941.
[47] Jack Williamson, *Dragon's Island* (New York: Simon & Schuster, 1951).
[48] Arthur C. Clarke, *Islands in the Sky* (Philadelphia: John C. Winston, 1952).
[49] David Gerrold, *When HARLIE Was One* (New York: Ballantine Books, 1972).
[50] William Gibson, "Burning Chrome," *Omni*, July 1982.
[51] Aldous Huxley, *Brave New World* (London: Chatto & Windus, 1932).

(*1984*),[52] and today's *Black Mirror* (TV series 2004 - ongoing);[53] and how their hypothetical scenarios often echo the concerns raised in real-life debates over technology and its implications for human life and society. Law being connected with literature and other sciences is not a new idea, "the lawyer and the literary critic, as readers of texts, face difficulties and enjoy opportunities that are far more alike than may seem at first to be the case".[54] Less obvious, nonetheless, is how law and cultural expressions can assume a significant interplay where legal and cultural dimensions seamlessly blend and become allies, such as in science fiction. The field of "law and literature" exists as a rich body of interdisciplinary scholarship.[55] Increasingly, scholars have examined law and science fiction as interconnected, particularly when addressing technological progress. In examining literary responses to technology, works of science fiction provide dynamic sites for interrogating the ethical and legal implications of emerging technologies, from artificial intelligence to biotechnology.[56] "By highlighting possible futures, science fiction enables law to consider different strategies for dealing with new events and scenarios".[57] While legal thought experiments are often limited because they are immediately connected to a particular concern or case, as we saw in the example of ectogenesis and others, authors of science fiction examine technology as extended hypothetical thought experiments. They add potential legal, psychological, personal, political and ethical complications and dangers to their narratives. They create complex fictional societies to investigate the possible effects of politics, power, gender and the emotional, personal, collective, and global consequences of technology and the development of possible futuristic approaches. They actively contribute to the ongoing dialogues surrounding science, philosophy, and the future, often blurring the lines that separate factual conjecture from imagination. Similar to a policy report or a law journal article engaging in debates about a number of challenges and potential problems, we find authors exploring the same questions and creating complex narratives and situations to investigate the very same challenges.[58] Therefore, if hypothesizing is integral to legal thinking, ultimately science fiction has the capacity to animate entire worlds based on a single or multiple hypotheses making it a powerful thought experiment for legal analysis.

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[52] William Gibson, *Neuromancer* (New York: Ace Books, 1984).
[53] The Black Mirror Project, "Speculating the Future of Digital Media and Technology" (2011). Available at: https://blackmirrorideas.wordpress.com, accessed 17 January 2024.
[54] James Boyd White, "Law as Language: Reading Law and Reading Literature," *Texas Law Review* 60 (1982): 415-445, 415.
[55] The modern law and literature movement started in the 1960s and 1970s with the early ideas of legal scholars John H. Wigmore and Justice Benjamin N. Cardozo, and with James Boyd White who is generally accredited with initiating the movement.
[56] See Carpi, *Law and Culture in the Age of Technology*, 15-42.
[57] Mitchell, "Making space: Law and Science Fiction," 248.
[58] Jorge L. Contreras, "The Fiction of Fiction: Reassessing Copyright Protection of Fictional Works," *Law & Literature* 29.3 (2017): 435-470, 435.

The need of developing approaches for engaging with science fiction in legal scholarship has never been greater. We find ourselves at a distinctive historical juncture where the temporal gap between science fiction speculation and technological reality is collapsing. Technologies that appeared in speculative fiction mere decades ago—artificial intelligence, gene editing, reproductive technologies—now demand immediate legal regulation. This acceleration creates an unprecedented opportunity: rather than waiting for technologies to mature and then reactively scrambling to regulate their consequences, legal scholarship can proactively engage with science fiction texts that explore these technologies in their advanced forms. By doing so, law can anticipate regulatory challenges, identify potential harms, and develop frameworks before technologies become entrenched in ways that make regulation more difficult. Science fiction thus offers legal scholarship a temporal advantage—the ability to think through legal implications while technologies remain malleable and subject to design choices that can embed legal and ethical considerations from the outset.

Part II: Beyond Popular Assumptions and towards Understanding Science Fiction for Legal Enquiry

Having established the philosophical tradition linking law and science fiction, the next question is: what exactly is science fiction, and how can legal scholars engage with it rigorously? Answering this question requires understanding science fiction on its own literary terms, but two challenges complicate this task. First, science fiction faces persistent misperceptions as an unserious entertainment genre.[59] This skepticism may stem from the genre's characteristic use of empirically implausible or even physically impossible scenarios that appear far removed from traditional legal hypotheticals. Legal judgments have at times reinforced this view, invoking science fiction dismissively to denote unreasonableness or associating the genre with defendants charged with violent behaviour.[60] Second, discussions of science fiction sometimes lack sufficient grounding in the genre's literary foundations, leading to reductive approaches that treat science fiction merely as a predictive tool or characterize it narrowly as exclusively dystopian. These approaches obscure the genre's actual complexity and utility. This Part addresses these challenges through

[59] Contreras notes that science fiction has an "uneven reputation." However, in making his case for science fiction in law, he reflects: "[w]hile science fiction as a literary genre has its detractors, it cannot be denied that science fiction stories […] reach a vast audience." He does not clarify what these "detractors" are, nor does vast audienceship alone make a compelling argument for understanding the genre for law. Contreras, "Science Fiction and the Law," 65, 70.

[60] In Tyrer v United Kingdom (A/26), (1979-80) 2 E.H.R.R. 1, p 25: "even science fiction has not yet pictured a world in which it is inflicted by machines." In W v E, [1989] 11 WLUK 129, "I would link his interest in homemade bombs to his major interest in hospital in watching science documentaries and reading science fiction." In R. v TS, [2008] EWCA Crim 6, p 24: the defendant convicted of rape has "a particular interest in science fiction". In R. v Sears (Andrew Robert), [2003] EWCA Crim 367: referring to behaviour of a paedophile; "[a]t different stages of his life the appellant has amassed vast collections of ice-lolly sticks, golf balls, comics, magazines, computer games, science fiction videos and so forth." In Knott V Haden Maintenance Ltd [1998] 6 WLUK 246, p 247: the mentally ill "[h]e had very few interests and was confined more or less to reading science fiction, often the same passages over and over." Also see Mitchell, "Making space: Law and Science Fiction".

three sub-sections. *First, it defines science fiction,* distinguishing the genre from fantasy and identifying its essential elements (the novum, cognitive estrangement, and paradigm shift). *Second, it traces the genre's evolution* alongside technological development, showing how science fiction increasingly engages with technologies that blur boundaries between speculation and reality. *Third, it dispels common misconceptions*—particularly that science fiction is primarily predictive or exclusively dystopian—that can impede productive legal engagement with the genre.

Defining Science Fiction

Science fiction exists within the broader category of speculative fiction, but possesses distinct characteristics that make it particularly valuable for legal inquiry.[61] To begin with, the umbrella term is "speculative fiction".[62] It is an expansive spectrum that "includes what is usually labeled science fiction, fantasy, several subgenres and other non-mimetic genres".[63] Although there have been attempts to separate these terms, more recently, there has been a growing consensus around the term "speculative fiction" as an inclusive arch uniting these diverse narratives rather than fragmenting them.[64] Science fiction and fantasy are speculative fiction, but the difference, put simply, is that while science fiction draws on and extrapolates from what we know about reality and science, fantasy invents what does not, and likely could not, exist in our reality e.g. wizards, dragons and trolls.[65] As the famous science fiction and fantasy author Terry Pratchett humorously said; you can explore "the nature of belief, politics and even journalistic freedom, but put in one lousy dragon and they call you a fantasy writer".[66] Science fiction however revolves around the introduction of a disruptive technology that reorders the world in its image such as time travel, Martians, artificial intelligence, robotics, or cloning —a technology or a new thing (yes, it doesn't need to be "technology") that is viewed as revolutionary development that will transform society for the better. Such characteristics ostensibly estrange science fiction from a tangible legal discourse. This very "estrangement" however is the main element of science fiction, and in contrast to common assumptions, it is not so much

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[61] See R.B. Gill, "The Uses of Genre and the Classification of Speculative Fiction," *Mosaic: An Interdisciplinary Critical Journal* 46.2 (2013): 73; Marek Oziewicz, "Speculative Fiction," in *Oxford Research Encyclopedia: Literature* (Oxford: Oxford University Press, 2017). Available at: https://oxfordre.com/literature/display/10.1093/acrefore/9780190201098.001.0001/acrefore-9780190201098-e-78, accessed 1 January 2024.

[62] Oziewicz, "Speculative Fiction."

[63] Britt Johanne Farstad, "Introduction," in *Populating the Future: Families and Reproduction in Speculative Fiction* (Oslo: Kriterium, 2023), 14.

[64] See Lucie Armitt, *Contemporary Women's Fiction and the Fantastic* (Basingstoke: Macmillan, 2000), 13; Brian Attebery, *Strategies of Fantasy* (Bloomington: Indiana University Press, 1992), 12.

[65] Brian Laetz and Joshua J. Johnston, "What is Fantasy?," *Philosophy and Literature* 32.1 (2008): 161-172, 161.

[66] Boyd Tonkin, "Pratchett Takes Swipe at Tolkien as He Wins His First Award," *The Independent*, 13 July 2002. Available at: https://www.independent.co.uk/arts-entertainment/books/news/pratchett-takes-swipe-at-tolkien-as-he-wins-his-first-award-184067.html, accessed 1 January 2024.

about predicting the future, but rather about exploring present anxieties based in today's science in possible future scenarios — the very same anxieties legal discourses contend with.[67]

Now that we have established that science fiction is a genre of speculative fiction, what is science fiction? "Science fiction" is such a contested term but at least there is consensus among literary critics that the nature of the genre, with its unbound freedom to imagine other worlds, resists a fixed definition. There is really no good reason to expect that a workable definition of science fiction will ever be established. None has been, so far. In practice, there is much consensus about what science fiction looks like in its center; it is only at the fringes that most of the fights take place—it is still not possible to describe science fiction as a homogeneous form of writing.[68]

Nonetheless, I will attempt to provide a working understanding of the essential elements to form a foundation for exploring the potential of science fiction as a thought experiment for legal inquiry. Based on Darko Suvin's influential analysis of science fiction, I will distinguish three elements that are fundamental for every science fiction work: the novum, cognitive estrangement and paradigm shift.[69] "The novum" (Latin for 'the new thing') refers to the introduction of a new and innovative element into the narrative. This can be a technological invention, a societal structure, or any other concept that deviates from the familiar reality. It serves as a catalyst for the narrative, disrupting the status quo and introducing a speculative element that distinguishes science fiction from other literary genres. "Cognitive estrangement" is the effect created by the novum. It involves presenting the familiar in an unfamiliar way, challenging readers to reconsider their assumptions about reality. The "paradigm shift" represents a transformation in the way people perceive and understand the world around them. The three characteristics are interrelated. The novum, with its inherent cognitive estrangement, acts as a narrative device that drives the story forward. It prompts characters and readers alike to grapple with the implications of the speculative element. As characters navigate the consequences of the novum, the narrative reflects a process akin to a "paradigm shift" within the fictional world. The introduction of the novum disrupts the existing paradigm, leading to a reconfiguration of societal, ethical, or scientific frameworks within the story. In summary, the novum and cognitive estrangement work in tandem to create a sense of paradigm shift. The introduction of a speculative element challenges preconceived notions and norms, prompting a reassessment of the fictional world's

[67] Some scholars argue that science fiction could at times retain some relation to the future not through prediction but through "social forecasting." See Sean Seeger and Daniel Davison-Vecchione, "Daniel Bell, Social Forecasting, and Science Fiction," *Extrapolation* 64.2 (2023): 167-187, 168. This, however, does not detract from the value it imparts on the present.
[68] John Clute and Peter Nicholls, *The Encyclopaedia of Science Fiction* (London: Orbit, 1993), 314.
[69] Darko Suvin, *Metamorphoses of Science Fiction: On the Poetics and History of a Literary Genre* (New Haven: Yale University Press, 1979).

fundamental principles—*a process that mirrors the transformative nature of a paradigm shift in the real world.*

To illustrate, let us analyze Aldous Huxley's *Brave New World* through these elements.[70] The novum, the principal element that differentiates the imagined world is the society's artificial reproductive technology. It disrupts traditional norms, challenging readers to reconsider assumptions about family, individuality, and natural processes. This novum induces cognitive estrangement, prompting critical engagement with the societal implications of such a technological advance. The resulting paradigm shift within the World State reflects a fundamental transformation in ethical, legal, social, and scientific frameworks. Characters navigate the consequences of this shift, highlighting the narrative's exploration of the transformative nature of a paradigm shift. Another example, Orwell's *1984*, the novum in this dystopian world lies in the omnipresent surveillance technology and the oppressive political regime, challenging conventional notions of privacy and freedom.[71] Cognitive estrangement arises as readers confront a distorted reality where truth is manipulated, prompting reflection on the consequences of unchecked state power. The narrative induces a paradigm shift by depicting a society governed by thought control, urging readers to re-evaluate the importance of truth, individual agency, and governmental accountability. Orwell's *1984* serves as a compelling legal inquiry tool, delving into issues of surveillance, censorship, and authoritarianism, offering a cautionary exploration of the legal implications of unchecked governmental authority in the face of evolving technologies.

Science fiction narratives are intertwined with legal considerations because dealing with the novum/nova of the story necessitates creating new law. Examples such as ectogenesis, artificial intelligence, hybrid beings, extra-terrestrial life, and others require the formulation of distinct laws to govern their existence. This inherent connection between science fiction and law positions science fiction as an optimal space for envisioning regulatory changes in response to technological disruptions. Authors exploring better futures start testing the laws of their imagined world leveraging big ideas through characters' choices. As soon as a new law follows from the nova, there's the opportunity to break it and face the consequences. If it is an unjust law, the characters will transgress to push the limits and so on. Legal scholars can leverage the tools of science fiction to address pressing issues, such as determining tort liability for artificial wombs, defining legal rights and responsibilities of artificial intelligence, formulating laws to control the use of autonomous weaponry, etc.[72] Having established these foundational elements of science fiction, it is crucial to

[70] Huxley, *Brave New World*.
[71] George Orwell, *Nineteen Eighty-Four* (London: Secker & Warburg, 1949).
[72] Christopher Brown, "Will There Be Justice? Science Fiction and The Law," *Reactor*, 7 August 2019. Available at: https://reactormag.com/will-there-be-justice-science-fiction-and-the-law/, accessed 1 January 2024.

understand how the genre itself has evolved alongside technological development, as this evolution profoundly impacts its utility for legal inquiry.

The Evolution of Science Fiction: From Speculation to Reality

Now that we have a working understanding of science fiction, it is important to address how the genre has evolved over time, particularly in relation to technological development. Science fiction has always maintained a complex relationship with technological advancement, but in recent decades, this relationship has intensified as technologies once relegated to pure speculation increasingly materialize in our lived reality. Contemporary science fiction engages with technologies that occupy an increasingly ambiguous space between imagination and actuality. Consider artificial intelligence: what was once purely speculative terrain—thinking machines, autonomous systems, artificial consciousness—has become the subject of urgent regulatory concern. Today's AI systems, while not possessing the full autonomy or consciousness depicted in works like Isaac Asimov's Robot series[73] or the film *Ex Machina*[74], nonetheless raise pressing legal questions about liability, personhood, and agency that science fiction has long explored. Similarly, biotechnologies including CRISPR gene editing,[75] synthetic biology, and advanced reproductive technologies transform science fiction scenarios into imminent or actual realities requiring legal frameworks.[76] This evolution means that science fiction increasingly functions not merely as distant speculation but as near-future scenario planning. We now live in an era "infused with sci-fi tropes from the past," where the distinction between science fiction and technological reality becomes productively blurred.[77] The genre has adapted to engage with technologies at various stages of development—from pure speculation, to emerging research, to commercialized reality—providing legal scholars with a spectrum of thought experiments corresponding to different temporal horizons of technological implementation.

This temporal evolution enhances science fiction's value for legal inquiry in several ways. First, it allows legal scholars to track how fictional engagement with a technology evolves as that technology moves from speculation to reality, revealing shifting anxieties and regulatory concerns. Second, it demonstrates science fiction's prescience regarding certain technological trajectories, validating the genre's capacity to identify salient legal issues before they fully materialize. Third, it shows that some contemporary science fiction

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[73] Isaac Asimov, *I, Robot* (London: Dennis Dobson, 1950).
[74] *Ex Machina*, directed by Alex Garland (London: DNA Films/A24, 2014).
[75] Martin Jinek, Krzysztof Chylinski, Ines Fonfara, Michael Hauer, Jennifer A. Doudna, and Emmanuelle Charpentier, "A Programmable Dual-RNA–Guided DNA Endonuclease in Adaptive Bacterial Immunity," *Science* 337.6096 (2012): 816-821.
[76] Daniela Carpi, "Have We Ever Been/Will We Still Be Human? Law and Literature Faced with the Shifting Boundaries of Humanity and Technology," *Pólemos* 17.1 (2023): 1-5.
[77] Tranter, *Living in Technical Legality*, 2.

represents not distant speculation but urgent extrapolation from current technological capabilities, making such works immediately relevant to legal analysis.

The genre has also evolved in its sophistication regarding legal and regulatory frameworks. Contemporary science fiction often incorporates detailed consideration of legal structures governing technological innovation. Works like Annalee Newitz's *Autonomous* (2017) engage explicitly with patent law and pharmaceutical regulation,[78] while Martha Wells's *Murderbot Diaries* series explores questions of artificial intelligence rights and corporate liability with nuanced attention to legal complexity.[79] This evolution reflects both the genre's maturation and the increasing inseparability of technological development from legal considerations. Moreover, certain subgenres have emerged that specifically engage with near-future technological and legal scenarios. Climate fiction ('cli-fi'), [80] for instance, explores legal and governance challenges arising from climate change and environmental transformation—as exemplified by Kim Stanley Robinson's *The Ministry for the Future* (2020), which engages extensively with international climate governance and geoengineering regulation.[81] Biopunk[82] examines biotechnological futures and their regulatory implications, such as Paolo Bacigalupi's *The Windup Girl* (2009), which addresses intellectual property rights in genetically modified organisms and corporate control of biotechnology.[83] These specialized subgenres demonstrate science fiction's evolution toward increasingly focused engagement with specific technological and legal domains.

This evolution challenges any simplistic characterization of science fiction as purely predictive or dystopian, themes I will address more fully below. Contemporary science fiction encompasses a broad spectrum from cautionary dystopias to optimistic utopias, from near-future realism to far-future speculation. This diversity reflects the genre's maturation and its increasingly sophisticated engagement with technological and social change. Legal scholars benefit from recognizing this diversity, as different forms of science fiction serve different analytical purposes depending on the technology and temporal horizon under examination. Furthermore, this evolution highlights the particular value of a category I term "realist science fiction"—texts that combine realistic settings with speculative technological elements, which will be addressed in Part III.

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[78] Annalee Newitz, *Autonomous* (New York: Tor Books, 2017).
[79] Martha Wells, *All Systems Red* (New York: Tor.com Publishing, 2017). *(First book in The Murderbot Diaries series)*
[80] Axel Goodbody, "Cli-Fi - Genre of the Twenty-First Century? Narrative Strategies in Contemporary Climate Fiction and Film," in Maria Löschnigg and Melanie Braunecker (eds), *Green Matters: Ecocultural Functions of Literature* (Leiden: Brill, 2019), 131-153; and Matthew Schneider-Mayerson, "The Influence of Climate Fiction: An Empirical Survey of Readers," *Environmental Humanities* 10.2 (2018): 473-500.
[81] Kim Stanley Robinson, *The Ministry for the Future* (New York: Orbit Books, 2020).
[82] Lars Schmeink, *Biopunk Dystopias: Genetic Engineering, Society, and Science Fiction* (Liverpool: Liverpool University Press, 2016).
[83] Paolo Bacigalupi, *The Windup Girl* (San Francisco: Night Shade Books, 2009).

Dispelling Common Misconceptions

Despite this evolution and diversification, two persistent misconceptions continue to shape engagement with science fiction: the genre's purported role to "predict" and its supposedly dystopian nature. "Common approaches to science fiction as a prophecy to produce valid visions of the technology and societies of the future have and will fail",[84] because the relationship between science fiction and the future is not intended to be in this narrow predictive sense. You will find a general consensus among theorists and authors about this basic conception: "[s]cience fiction's specific ability is not so much to predict the future […] but to show our own present through a particularly effective distorting lens";[85] a science fiction world's difference in time or place from our own is "contained within a cognitive continuum with the actual";[86] "I'm not a prophet [… In] science fiction it's always about now";[87] and "[t]he point of a novel about the future is not to predict it; I'm not pretending to be Nostradamus. The point of such writing is to influence the present by extrapolating current trends for advancement or detriment".[88] They have drawn out some nuances and implications that retain a connection with the future. For instance, Ursula K. Le Guin acknowledges that "extrapolation is an element in science fiction," but still asserts that "the 'future' […] cannot be predicted" and that "science fiction isn't about the future".[89] The uniqueness of science fiction lies in its ability to impact the present by crafting future-oriented scenarios that inspire reflection on our contemporary moment through a distorting sense. "Cognitive estrangement," as a device, manipulates time akin to a time machine, it aims to reshape the contemporary present into "the determinate past of something yet to come".[90] In other words, "by approaching the present with hindsight, it becomes possible to experience it as a moment in history".[91] Thus, "estrangement" allows us to perceive the present from an external vantage point, rendering the familiar defamiliarized and thereby affording us enhanced clarity for understanding our society. In this light, if understanding new technology in society "requires a prior awareness that we inhabit a contingent historical process open to redirection and intervention, estrangement" gives us this advantage.[92] In other

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[84] Gary Westfahl, "Pitfalls of Prophecy: Why Science Fiction So Often Fails to Predict the Future," in Kin Yuen Wong, Gary Westfahl, and Amy Kit-sze Chan (eds), *Science Fiction and the Prediction of the Future: Essays on Foresight and Fallacy* (Jefferson, NC: McFarland, 2011), 4.

[85] Peter Fitting, "Utopia, dystopia and science fiction," in Gregory Claeys (ed.), *The Cambridge Companion to Utopian Literature* (Cambridge: Cambridge University Press, 2010), 144.

[86] Carl Freedman, "Science Fiction and Critical Theory," in Rob Latham (ed.), *Science Fiction Criticism: An Anthology of Essential Writings* (London: Bloomsbury, 2020), 232.

[87] Lisa Allardice, "Margaret Atwood: 'I am not a prophet. Science fiction is really about now'," *The Guardian*, 20 January 2018. Available at: https://www.theguardian.com/books/2018/jan/20/margaret-atwood-i-am-not-a-prophet-science-fiction-is-about-now, accessed 20 February 2024.

[88] Marge Piercy, *Woman on the Edge of Time* (London: The Women's Press, 1979), vii.

[89] Ursula K. Le Guin, *Dreams must explain themselves and other essays, 1972-2004* (London: Gollancz, 2018), 46-48.

[90] Fredric Jameson, *Archaeologies of the Future: The Desire Called Utopia and Other Science Fictions* (London: Verso, 2005), 288.

[91] *Ibid.,* 76.

[92] *Ibid.*

words, just as our past led to us today, our perception of the future influences the actions we take now to shape that future. Thus, the themes in science fiction, no matter how seemingly alien, with time travelling Martians in unforeseeable futures, invariably originate from and end with issues in the society in which the author and their readers currently reside.

Robert Louis Stevenson's *The Strange Case of Dr Jekyll and Mr Hyde* (1886) demonstrates how science fiction engages with present concerns through future-oriented scenarios.[93] The novum—a chemical transformation developed by the physician Jekyll—captures the Victorian mindset toward medical advances, an attitude that finds direct echoes in contemporary concerns as we grapple with molecular medicine and genome editing technologies like CRISPR-Cas9.[94] Stevenson's text examines the profound ambivalence surrounding medical breakthroughs: Jekyll embodies noble aspirations to benefit humanity through scientific progress, while Hyde represents the uncontrollable consequences of intervening in processes not fully comprehended. The text does not predict today's biotechnologies but captures enduring societal sentiments—the simultaneous excitement and fear that accompany transformative medical innovation. Significantly, Stevenson makes the reliable narrator a discerning lawyer, Mr. Utterson, implying that resolution can emerge only through rational legal inquiry. The novel probes fundamental legal questions: Can Jekyll be held responsible for Hyde's actions when medical intervention fractures his identity? Where are the ethical and moral boundaries when scientific procedures blur distinctions between humanity and criminality? The narrative engages legal discourse on sanity, culpability, and what it means to be "human" within legal frameworks—questions that remain urgent as biotechnology challenges our foundational categories. Stevenson's work becomes a catalyst for examining how law must adapt when technology transforms fundamental aspects of human identity and agency. Therefore, to advocate the genre as a serious lens for legal analysis necessitates resisting the inclination to perceive it merely as a tool for prediction, because while it maintains a connection with the future through extrapolation or "social forecasting," as discussed earlier, its true value lies in its ability to stimulate critical examination of present issues rather than foresee specific outcomes.

In a similar vein demonstrating one of the ways in which science fiction texts are relevant to legal concerns, Philip K. Dick's *The Minority Report* (1956) is about a world where people are prosecuted for crimes the system predicts they will commit in the future (the novum), raising issues pertaining to the right to fair trial that are very relevant to today's problematic use of AI in the criminal justice system such as risk assessment

[93] Robert Louis Stevenson, *The Strange Case of Dr Jekyll and Mr Hyde* (London: Longmans, Green & Co., 1886).
[94] Jennifer A. Doudna and Erik J. Sontheimer, *The Use of CRISPR/cas9, ZFNs, TALENs in Generating Site-Specific Genome Alterations*, 1st ed. (San Diego: Elsevier Science & Technology, 2014).

instruments (RAI).[95] RAI are actuarial assessment based on data analysis and used mostly in taking judicial decisions and are preferred at the stage of determining punishments, convictions, and bails.[96] In *State v. Loomis*, Correctional Offender Management Profiling for Alternative Sanctions (COMPAS) sentenced the accused to six years of imprisonment.[97] The defendant claimed that the calculation of his recidivism score was too high, and it violated his right to due process, particularly because the assessment made by the COMPAS is unclear and its accuracy is impossible to challenge.

Similarly, following the overturning of *Roe v Wade* in 2022, Margaret Atwood shared a telling image of herself holding an "I told you so" mug,[98] reflecting on her novel *Handmaid's Tale* (1985).[99] She clarified that she did not predict the specific overturning but had foreseen the possibility of a "religious-right takeover in the US",[100] noting, "I invented Gilead. The Supreme Court is making it real".[101] Her intent in the text was not prophetic but rather to animate a novum/hypothesis about a society grounded in present concerns regarding the rise of the religious right in the United States. She provocatively questioned whether the US could succumb to "theocratic dictatorships", emphasizing that such regimes are not confined to the distant past but persist on the planet today. *The Handmaid's Tale* urges ongoing vigilance against the erosion of democratic values in increasingly far right society lest the speculative scenarios become potential realities.

The second generalization, which could potentially hinder the use of the genre for legal inquiry, is the tendency to pigeonhole science fiction as predominantly invoking dystopian scenarios. Contrary to this perception, science fiction critically engages in the representation of novel worlds through a reflective process that draws parallels with contemporary society.[102] While serving as a cautionary medium, warning against perilous futures if present caution is neglected, science fiction simultaneously embraces a consciously utopian function.[103] Recognizing science fiction as a genre embodying both cautionary tales and utopian aspirations not only corrects the misconception but also positions it as a space to exercise legal inquiries more generally. Moreover, present objections to cutting-edge technologies often hinge on legal

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[95] Philip K. Dick, "The Minority Report," *Fantastic Universe*, January 1956.
[96] Ben Winters, "AI in the Criminal Justice System," Electronic Privacy Information Centre, 2022. Available at: https://epic.org/issues/ai/ai-in-the-criminal-justice-system/, accessed 20 February 2024.
[97] *State v. Loomis*, 881 N.W.2d 749 (Wis. 2016).
[98] Margaret Atwood, Twitter post, 11 July 2022. Available at: https://twitter.com/MargaretAtwood/status/1546500429185486849, accessed 28 February 2024.
[99] Margaret Atwood, *The Handmaid's Tale* (Toronto: McClelland and Stewart, 1985).
[100] Margaret Atwood, Twitter post, 12 July 2022. Available at: https://twitter.com/MargaretAtwood/status/1546825708621778944, accessed 28 February 2024.
[101] Margaret Atwood, "I Invented Gilead. The Supreme Court is Making It Real," *The Atlantic*, 13 May 2022. Available at: https://www.theatlantic.com/ideas/archive/2022/05/supreme-court-roe-handmaids-tale-abortion-margaret-atwood/629833/, accessed 28 February 2025.
[102] Scott McCracken, *Pulp: Reading Popular Fiction* (Manchester: Manchester University Press, 1998), 23-24.
[103] *Ibid.*

concerns such as privacy, bias, and accountability.[104] In the trajectory of five, ten, or fifty years, as our control methods advance to address these legal objections, we will start using new technologies. Embracing science fiction as a space for legal exercise allows anticipation of this future and provides the opportunity to proactively regulate the technology itself.

Part III: "Realist Science Fiction" for Legal Inquiry

It is clear by now that science fiction texts can be written in various forms, with examples ranging from works like Margaret Atwood's *The Handmaid's Tale*, which revolves around reshaping a society similar to ours in response to a novum, to those adopting a "traditional" science fiction approach like H. G. Wells's *The War of the Worlds* (1898)[105], featuring alien invasions that drastically deviate from familiar reality. "Realist science fiction", as I define it, embodies a dual featured narrative blending aspects of realism and science fiction. Given that "realism" as a genre is a mimetic form of art, distinguished by being void of speculative and supernatural elements, and generally perceived in binary terms with non-memetic forms art such as science fiction, "realist science fiction" may appear oxymoronic. However, when narratives maintain realistic settings while introducing technological nova, the two genres can combine productively. I will argue that a realist science fiction text is still primarily a science fiction text but with a nexus to the realist tradition — making it an invaluable space for legal inquiry to catch up to emerging technologies.[106] This Part proceeds in three stages: it defines "realist science fiction" by establishing its relationship to literary realism, demonstrates the concept through analysis of *1984* and Helen Sedgwick's *The Growing Season*, and concludes with methodological guidance for engaging realist science fiction texts in legal inquiry.

The first theoretical formulation of realism is the principle of "*mimesis*" in Aristotle's *Poetics.* While there are numerous variations that account for defining realism,[107] for the purpose of this argument I emphasize that I am simply referring to realism in the broadest sense as "a formula of art which, conceiving of reality in a certain way, undertakes to represent a simulacrum of it on the basis of a more or less fixed rules."[108] In other words, *mimesis* signifies the desire to imitate reality with such proximity that the audience can share the artist's experience. Hence, my reference to "realism" is intended in a narrow sense where a narrative

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[104] Lubna Luxmi Dhirani et al., "Ethical Dilemmas and Privacy Issues in Emerging Technologies: A Review," *Sensors* 23.3 (2023); David Restrepo Amariles and Pablo Marcello Baquero, "Promises and limits of law for a human-centric artificial intelligence," *Computer Law & Security Review* 48 (2023).
[105] H.G. Wells, *The War of the Worlds* (London: William Heinemann, 1898).
[106] Especially when the genre of science fiction has evolved in a way memetic to reality as discussed in section II.
[107] Dario Villanueva, *Theories of Literary Realism* (Albany: State University of New York Press, 1997).
[108] George J. Becker, "Introduction," in George J. Becker (ed), *Documents of Modern Literary Realism* (Princeton: Princeton University Press, 1963), 36.

unfolds within our familiar world; where the laws of gravity persist, and time travel and aliens are absent. Dwelling on this point, I would like to invoke in parallel the earlier discussion where I addressed how science fiction is not about predicting the future but rather about projecting present issues via a distorting lens in the future. I concluded that the themes in science fiction, no matter how seemingly alien, with time travelling Martians in unforeseeable futures, invariably originate from and end with issues in the society in which the author and their readers currently reside.[109] Thus, science fiction is about examining the issues/injustices of the world we live in using a speculative prism to show us alternative paths to which realism is blind. In fact, Le Guin herself has argued once that "serious science fiction is a mode of realism, not of fantasy".[110] If we were to chart any science fiction text, it would not be radical to say that the first axis would be realism and the second is science fiction elements: novum and cognitive estrangement. To what degree the science fiction world follows the physical laws of realism (i.e. our world), will depend on the type of text the author choses to create. In fact, our emerging technologies are advancing so fast that science fiction has been called the realism of the 21st century.[111] Therefore, when a text mimics our reality while introducing a novum (e.g. an emerging technology) to explore the paradigm shift, one that could unfold in our world, then it makes for *a realist science fiction* text.

For example, George Orwell's 1984 would be an exemplary realist science fiction text. In the realist tradition, the novel depicts life and society as they were during its writing, i.e. without any fictional elements of flying cars or space travel. Simultaneously, it is speculative in the science fiction tradition as Orwell explores the technologically advanced hypothesis of pervasive surveillance in a dystopian cautionary masterpiece. Orwell's exploration of a dystopian society, where the ruling party exercises absolute control, offers profound legal implications. If we were to open this novel to legal analysis, at the time it was published, we would have been able to extrapolate from Orwell's surveillance hypothesis, several human rights implications: freedom of thought and expression, privacy and surveillance, freedom of assembly and association, right to a fair trial, freedom of the press, the right to equality, freedom from torture and inhumane treatment, the right to family life, the freedom of movement, and the right to education. One can see how the novel emphasises the importance of safeguarding these rights to maintain a just and free society. Interestingly, the text, published in 1949, was written in 1948 the year the Universal Declaration of Human Rights was adopted, when most of these rights were codified for the first time. This illustrates how this

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[109] In Part II.

[110] Ursula K. Le Guin, "Magical History Tour," *The Guardian*, 3 June 2006. Available at: https://www.theguardian.com/books/2006/jun/03/travel.travelbooks, accessed 14 February 2024.

[111] Richard Lea, "Science Fiction: the Realism of the 21st Century," *The Guardian*, 7 August 2015. Available at: https://www.theguardian.com/books/2015/aug/07/science-fiction-realism-kim-stanley-robinson-alistair-reynolds-ann-leckie-interview, accessed 14 February 2024.

work is both memetic and non-memetic: speculating with a highly probable hypothesis, 1984 imitates reality with such verisimilitude that the audience can possibly share the experience of the protagonists. Therefore, such science fiction narratives, characterised by their closeness to realist hypothesis, prove not only highly amenable to legal analysis but also offer heightened awareness of the issues. By envisioning a future grounded in the present, the text provides a nuanced understanding of potential legal consequences, thus advancing the discourse on legal implications within a speculative framework. Proximity to reality is an important aspect because it makes a text relatable to an immediate legal inquiry. For example, there is a reason for Black Mirror's high popularity, and that is its proximity to our lives. The show's creator Charlie Brooker described it as "about the way we live now—and the way we might be living in 10 minutes' time if we are clumsy."[112] Realist science fiction value to legal inquiry presents itself in the way these texts tell the story for us, fast-forwarding the technologies being developed to the point where the legal issues manifest clearly in the narrative.

For my second demonstration, I will refer to the question I posed earlier in the article regarding the emerging technology of ectogenesis on whether there would there be value in consulting with science fiction texts that dwell on this matter, in Part II. Helen Sedgwick's[113] *The Growing Season* (2017) is a realist science fiction because it maintains the physical laws of our world while animating the narrative with the hypothesis of having invented and used artificial wombs.[114] The hypothesis presents a near future in which babies can be grown in artificial wombs, called pouches, that can be carried around. How can law scholars and practitioners use this text as a thought experiment? They can conduct a comprehensive legal inquiry on artificial wombs by analyzing how the narrative dramatizes conflicts over parental rights, how characters navigate the regulatory landscape governing access to pouches, how socioeconomic inequalities shape who can afford this technology, and how the story's legal crises illuminate gaps in existing frameworks designed for traditional pregnancy. The novel transforms abstract regulatory questions into lived human experiences, allowing legal scholars to trace the cascading consequences of design choices, regulatory gaps, and enforcement mechanisms through the lives of characters who must navigate them. To begin with, the technology in this area has passed its infancy as it is being developed and tested by different companies all around the world.[115] In the USA regulators are already considering clinical trials.[116] While this technology

[112] Charlie Brooker, "The Dark Side of Our Gadget Addiction," *The Guardian*, 1 December 2011. Available at: https://www.theguardian.com/technology/2011/dec/01/charlie-brooker-dark-side-gadget-addiction-black-mirror, accessed 20 November 2024.
[113] Sedgwick is a British author and physicist with special interests in science, biotechnology and feminism. She holds an MLitt in Creative Writing from Glasgow University and a PhD in Physics from Edinburgh University.
[114] Helen Sedgwick, *The Growing Season* (London: Harvill Secker, 2017).
[115] Horn, "Will New Tech End the Need for Human Pregnancy?"
[116] Max Kozlov, "Human Trials of Artificial Wombs Could Start Soon. Here's What You Need to Know: US regulators will consider clinical trials of a system that mimics the womb, which could reduce deaths and disability for babies

is being designed as an alternative to neonatal intensive care, to combat premature mortality rates, there is no reason to think that in the future this technology will not be used to completely gestate a human entity from conception to term i.e. ectogenesis. Today, it is already very popular to resort to use of in vitro fertilization (IVF) technology, where eggs are collected from ovaries and fertilised by sperm in a lab. Then a procedure is done to place one or more of the fertilized eggs, embryos, in a uterus, which is where the foetus develops. With ectogenesis technology the embryo could be directly placed in an artificial womb to grow to term. As such, although the scenario raised from *The Growing Season* are by and large hypothetical and cannot currently be predicted when they might become a reality, they are very likely to happen not in the so distant future.[117] Therefore, it is precisely at this early stage that a legal analysis based on the possible direction of travel can be most useful. In the past, biotechnologies were developed and used only to face a host of legal and other challenges to their use—such was the controversial case with legal debates over the use of embryos between separated parents as in *Evans v United Kingdom* (2007),[118] or legal implications of sperm donations in *MacDougall v SW & Ors* (2022)[119]. Novel questions for the purpose of regulating are particularly difficult to anticipate in the context of artificial wombs because this technology enables the re-creation of human life through harnessing the biology of existing humans, raising "questions about the commodification and commercialisation of human life, in a way few medical advancements have done before".[120] Thus, thinking about these questions through the animated world of the novel may very well help us conceive appropriate law.

In its imagined world, the *The Growing Season* tests our current law after the paradigm shifts in society. It therefore acts as an extended hypothetical experiment that reveals to us possible directions of travel of using artificial wombs. For instance, one issue that arises from the text is how the gradual and the eventually complete privatisations of the UK's National Health Services (NHS) could be a slippery slope leading to serious legal issues. This is one aspect in the novel that invites us to exercise caution especially when measured against the existing trends. Today, and despite concerns and recommendations against outsourcing, recent developments, including the government's pandemic response elective recovery plan in

born extremely preterm," *Nature*, 14 September 2023. Available at: https://www.nature.com/articles/d41586-023-02901-1, accessed 13 January 2024.

[117] Helen Sedgwick, "Artificial wombs could soon be a reality. What will this mean for women?," *The Guardian*, 4 September 2017. Available at: https://www.theguardian.com/lifeandstyle/2017/sep/04/artifical-womb-women-ectogenesis-baby-fertility, accessed 10 January 2024.

[118] *Evans v. United Kingdom*, Application No 6339/05, European Court of Human Rights (2007).

[119] *MacDougall v. SW & Ors*, EWHC 2202 (Fam) (2022).

[120] Trudo Lemmens, Andrew Flavell Martin, Cheryl Milne and Ian B. Lee (eds), "Introduction," in *Regulating Creation: The Law, Ethics, and Policy of Assisted Human Reproduction* (Toronto: University of Toronto Press, 2018).

2022, indicate a commitment to further integrate the independent sector into health services delivery.[121] The UK government has been cautioned about the potential dangers of solidifying a longer-term trend of outsourcing NHS contracts and funding to independent sector providers in England, instead of sustainably increasing NHS capacity. Risks related to "transparency" and the potential for "uneven distribution of ISP capacity across England" could exacerbate health inequalities.[122]

Another issue in the text is how such technology while used in some states is prohibited in others, leading to transnational legal disputes. We see how artificial wombs get smuggled and sold in black markets cause a cascade of legal issues. Ectogenesis introduces unprecedented opportunities and risks to society and presents new challenges to the application of the law on national and international levels. The text allows us to consider various legal issues, including parental rights, custody and guardianship, property rights, ethical regulations, discrimination, abortion, outsourcing healthcare to private sector, socioeconomic equality, and privacy rights, as they undergo renegotiation in society. Furthermore, the text becomes a catalyst to contemplate solutions to certain challenges that may require consideration in the actual development and configuration of artificial wombs, as well as rethinking some of our existing laws. Being one of the authors, this is much like what the authors did in "Cyborg Soldiers: International Law and Military Brain-Computer Interfaces" while writing about the legal challenges of the military application of brain computer interfaces BCIs.[123] Although there was no mentioning of any literary texts, the authors engaged with science fiction texts/films to speculate the potential implications arising from the use of BCIs. Our recommendations could be subsequently used in the stage of design and configuration, regulation, as well as policy making. Scholars could consult with multiple texts on an issue or discuss certain issues in one text or both. In each case, science fiction texts can be very insightful in regulating emerging technologies.

The following offers a practical guide for engaging realist science fiction as a tool for anticipatory legal analysis. *First*, identify the novum and assess its current developmental stage—is this technology already in prototype, undergoing early clinical trials, or purely speculative? This situates the temporal horizon of analysis and indicates how imminent regulatory questions may be. *Second*, trace how the narrative dramatizes conflicts: which existing legal frameworks prove inadequate? Where do regulatory gaps

[121] NHS, "Delivery Plan for Tackling the Covid-19 Backlog of Elective Care," 4 August 2022. Available at: https://www.england.nhs.uk/coronavirus/publication/delivery-plan-for-tackling-the-covid-19-backlog-of-elective-care/, accessed 20 January 2024.
[122] In response, British Medical Association (BMA), "NHS Outsourcing Report," 15 March 2022. Available at: https://www.bma.org.uk/advice-and-support/nhs-delivery-and-workforce/commissioning/nhs-outsourcing, accessed 20 January 2024.
[123] Lubell and Al-Khateeb, "Cyborg Soldiers: International Law and Military Brain-Computer Interfaces".

emerge? How do characters navigate ambiguous legal terrain? The narrative structure often illuminates pressure points in current law. *Third*, examine the text's assumptions about technological implementation: what design choices does the author presuppose, and how might alternative configurations alter legal implications? This can inform not only regulation but also participatory design processes. *Fourth*, consider what the narrative reveals about social and economic dimensions of technological deployment—issues of access, inequality, distribution, and power that purely technical or doctrinal analysis might overlook. Legal consequences often depend less on technological capabilities than on how technologies are deployed across different social contexts. *Finally*, use the text as a catalyst for identifying legal questions requiring further research, viewing science fiction not as providing definitive answers but as making salient which questions demand attention before technological entrenchment occurs. This approach transforms realist science fiction from seemingly passive entertainment into an active tool for legal analysis. Scholars can engage with multiple texts addressing a single technology to identify patterns and variations or conduct deep analysis of specific issues within one text, or both. In each case, realist science fiction texts offer valuable insights for regulating emerging technologies at critical junctures when law can shape rather than merely react to technological development.

Conclusion:

The rapid advancement of transformative technologies presents unprecedented regulatory challenges, exposing the limitations of traditional legal methodologies in navigating the complexity of the 21st century. This article has introduced an interdisciplinary framework for conducting legal inquiries into emerging technologies through science fiction. Part I established the philosophical foundation of this framework by demonstrating how law and science fiction share a deep tradition of speculative thinking, both disciplines engaging with the same fundamental questions about human life, societal dynamics, and the consequences of technological change. Part II developed a conceptual understanding of science fiction for legal inquiry — unpacking the genre's essential elements, tracing its evolution as the boundary between speculation and reality increasingly collapses, and dispelling misconceptions that risk foreclosing interdisciplinary engagement. Part III introduced the central conceptual contribution of this article: the category of "realist science fiction. By combining realistic settings with speculative technological elements, realist science fiction projects emerging technologies to the point at which their legal implications become visible within recognisable social and institutional frameworks — making it an exceptionally valuable tool for anticipatory legal analysis. The article further offered a brief methodological guidance for how legal scholars might engage such texts systematically: identifying the novum and its developmental stage, tracing how the narrative dramatizes legal conflict, attending to the social and economic dimensions of technological deployment, and using the text as a catalyst for identifying the legal questions that demand

attention before the window for meaningful regulation closes. Having established this interdisciplinary foundation, the article hopes to serve as a steppingstone — equipping legal scholars and practitioners with a conceptual framework for engaging science fiction as a rigorous space of legal inquiry. This approach holds the potential not only to enrich legal scholarship but also to inform the development and configuration of emerging technologies themselves, ensuring their alignment with appropriate legal and ethical frameworks from the outset. As technologies continue to evolve at a pace that outstrips traditional legal methodologies, the conceptual framework developed here offers legal scholarship a proactive rather than reactive posture — particularly in domains such as artificial intelligence, biotechnology, climate law, and digital rights, where the future arrives faster than the law can follow.