"DOES THIS UNIT HAVE A SOUL?" AI-GENERATED WORKS, CREATIVITY RESEARCH, AND COPYRIGHT POLICY

This article contends that determining whether copyright protection should apply to AI-generated works requires understanding whether AI is "creative". If it is a tool, works generated using AI deserve copyright protection. However, if it is genuinely creative and appropriates the *locus* of creative labour from human minds, then those works may deserve less or no protection. Examining creativity research, the article concludes that AI is more than a tool but not fully creative. It suggests that provisions governing computer-generated works may balance the need for some protection, without imposing excessive access costs on the public in respect of AI-generated works.

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I. Introduction

1 One of the many questions arising in relation to artificial intelligence and copyright law since ChatGPT launched generative artificial intelligence ("GAI or AI") into public consciousness is whether, and to what degree, works generated using such programs are or should be protectable under copyright law. Underlying this important policy question, however, is an even more fundamental concern: Is AI

1 The title quote is by the sentient artificial intelligence character "Legion" from the game, *Mass Effect 3* (Bioware, 2012). The author is grateful for helpful comments on earlier drafts from Andrew Lensen, Matt Bartlett, Saw Cheng Lim and Mark Bennett. Material from this article has also been presented in Joshua Yuvaraj, "Submission: UK Copyright and Artificial Intelligence Consultation 2024–25", *The University of Auckland Faculty of Law Research Paper Series 2025* (21 February 2025) <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=5154425> (accessed 23 September 2025).

creative?[2] The focus of most copyright-AI scholarship is about how the current law does, or should, apply to the issues.[3] Yet a proper theoretical understanding of AI's creative capacity is vital to a policy response on artificially-generated works that neither stymies innovation (artists incorporating AI into the creative process) nor devalues human creativity, which copyright law is designed to uphold.[4]

2 In this article, this question is investigated through the lens of creativity research, a field of scholarship grounded in psychology, neuroscience and other disciplines that explores creativity's processes and measurements, and one which has helpfully informed copyright scholarship in other areas. This article aims to build a robust theoretical framework for normative claims about AI creativity that go beyond empirical observations about what AI can and cannot do (which are merely ontological without an evaluative framework). This framework, and the accompanying assessment of AI's creative capacities, will help copyright policymakers seeking to regulate AI-generated works under domestic copyright laws.

3 In Part II, an overview is provided of the intersection between copyright law, works generated by AI, and creativity. In Parts III and IV, creativity research is examined, focusing on (a) what it is; (b) how it defines creativity; and (c) how much emphasis it places on creativity having human origins. In Part V, the framework derived from creativity research is applied to AI's presently-known capacities to answer the question: Is AI creative? In Part VI, implications are drawn out for the question of protecting AI-generated works under copyright law.

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2 See, *eg*, Giorgio Franceschelli & Mirco Musolesi, "On the Creativity of Large Language Models" (2025) 40 *AI & Society* 3785.

3 Peter K Yu, "Artificial Intelligence, Autonomous Creation, and the Future Path of Copyright Law" (2025) 50 *Brigham Young University Law Review* 753 at 759.

4 Artificial intelligence ("AI") does not have an accepted definition: Pascal D König *et al*, "Essence of AI: What *Is* AI?" in *The Cambridge Handbook of Artificial Intelligence: Global Perspectives on Law and Ethics* (Larry A DiMatteo, Cristina Poncibò & Michel Cannarsa eds) (Cambridge University Press, 2022) at p 18. However, discussions of AI and intellectual property law proceed despite this definitional uncertainty: see generally Ryan Abbott, "Intellectual Property and Artificial Intelligence: An Introduction" in *Research Handbook on Intellectual Property and Artificial Intelligence* (Ryan Abbott ed) (Edward Elgar, 2022) at pp 2–7. While this article focuses mainly on issues arising from generative artificial intelligence systems based on large language models like ChatGPT, Google Gemini, Microsoft Copilot and DeepSeek, the analysis applies more broadly to any AI technology that produces what would conventionally be regarded as "creative" works, including but not limited to songs, poetry, books, screenplays and videos.

II. Copyright, artificial intelligence, and creativity: uncertain discourse

A. Artificial intelligence and copyright law

4 Copyright is an exchange of costs and benefits.[5] Granting property rights over works is seen as a necessary cost to cultivate creativity and innovation, and as an appropriate reward for the creative labour of human artists.[6]

5 Yet AI challenges this model in many ways, including the protection of AI-generated works under copyright law. The copyright model does not reflect how AI has changed creative practices in industries where outputs are ordinarily protected by copyright. People may have needed incentives to engage in the degree of creative labour normally associated with music, art, writing and more. However, the continued advancement of AI technology lessens the creative labour required to produce similar-looking and sounding works. The most obvious example is the rise of the prompt-based large language model system, which is trained on billions (potentially trillions) of data points to respond to human-entered stimuli with increasingly lifelike images, words, music and even video, which is the focus of this article.

6 Of course, it could be argued that providing the stimuli itself may justify copyright protection. Yet the relative lack of "creativity" or independent intellectual effort in the production of such works may suggest those "creators" should not receive copyright protection for the length of time, and in respect of the breadth of exclusive economic rights, they ordinarily would. In other words, the costs of granting copyright to society – the inability to freely access and reproduce creative outputs for lengthy periods of time – may not be justified because there is less of an incentive needed when AI can automate much of the "creative" process, and requires none of the incentive copyright law provides to perform the creative labour it is asked to perform.[7]

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5 William M Landes & Richard A Posner, "An Economic Analysis of Copyright Law" (1989) 18(2) *The Journal of Legal Studies* 325 at 326.

6 William M Landes & Richard A Posner, "An Economic Analysis of Copyright Law" (1989) 18(2) *The Journal of Legal Studies* 325 at 326; Gaétan de Rassenfosse, Adam B Jaffe & Joel Waldfogel, "Intellectual Property and Creative Machines" (2025) 4 *Entrepreneurship and Innovation Policy and the Economy* 47 at 51; Sabine Jacques & Mathew Flynn, "Protecting Human Creativity in AI-Generated Music With the Introduction of an AI-Royalty Fund" (2024) 73(12) *GRUR International* 1137 at 1138–1139.

7 Christophe Geiger, "When the Robots (Try to) Take Over: Of Artificial Intelligence, Authors, Creativity and Copyright Protection" in *Kreation Innovation Märkte* –

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7 Further, AI's "creative" capacities may adversely impact human creative effort. Artists and artist representative organisations have sounded the alarm for some time about the widespread devaluation of creative labour by the AI-driven ability to cheaply and quickly produce art, music and literature. While there is an absence of empirical data on the impact of granting copyright protection to AI-generated works on creators,[8] it is plausible that such a shift in creative industries may disincentivise creators from engaging in the labour necessary to produce art, music and literature in the ways they would have done so prior to AI.[9] Ironically, a downturn in the production of human-only creative output may be detrimental to the development of AI. Large language models are constantly being trained on content – yet when those models are trained on data generated by AI, "model collapse" can result; the quality of the product becomes worse and worse.[10] To that end, there is a strong argument to develop copyright law to provide incentives that override the concerns that arise from artists having to compete with those who use AI in their fields.

Creation Innovation Markets: Festschrift Reto M Hilty (Florent Thouvenin *et al* eds) (Springer Verlag, 2024) at p 73; see also Jozefien Vanherpe, "Artificial Intelligence and Intellectual Property Law" in *The Cambridge Handbook of the Law, Ethics and Policy of Artificial Intelligence* (Nathalie A Smuha ed) (Cambridge University Press, 2025) at p 218.

8 Christophe Geiger, "When the Robots (Try to) Take Over: Of Artificial Intelligence, Authors, Creativity and Copyright Protection" in *Kreation Innovation Märkte – Creation Innovation Markets: Festschrift Reto M Hilty* (Florent Thouvenin *et al* eds) (Springer Verlag, 2024) at p 72.

9 Julija Kalpokienė, *Law, Human Creativity and Generative Artificial Intelligence* (Routledge, 2024) at p 106.

10 Ilia Shumailov *et al*, "AI Models Collapse When Trained on Recursively Generated Data" (2024) 631 *Nature* 755; Emily Wenger, "AI Produces Gibberish When Trained on Too Much AI-Generated Data" (2024) 631 *Nature* 742; Aaron J Snoswell, "What is 'Model Collapse'? An Expert Explains the Rumours About Impending AI Doom", *The Conversation* (19 August 2024) <https://theconversation.com/what-is-model-collapse-an-expert-explains-the-rumours-about-an-impending-ai-doom-236415> (accessed 23 September 2025); see also Christian Peukert, "Copyright and the Dynamics of Innovation in Artificial Intelligence" (2025) *Proceedings of the 58th Hawaii International Conference on System Sciences* 4480 at 4488; Gaétan de Rassenfosse, Adam B Jaffe & Joel Waldfogel, "Intellectual Property and Creative Machines" (2025) 4 *Entrepreneurship and Innovation Policy and the Economy* 47 at 72. This continues to be true despite the allure of synthetic (artificially-generated) training data to overcome the risk of running out of human-generated training data; synthetic data at present raises enough concerns not to be a reliable solution. See further James Jin Kang, "Tech Companies Are Turning to 'Synthetic Data' to Train AI Models – but There's a Hidden Cost", *The Conversation* (13 January 2025) <https://theconversation.com/tech-companies-are-turning-to-synthetic-data-to-train-ai-models-but-theres-a-hidden-cost-246248> (accessed 23 September 2025).

8 On the other hand, copyright frameworks that provide no protection for works generated by AI at all risk stymying innovation and technological advancement in creative industries, and the societal benefits that may arise as a result.[11] The United States Copyright Office has, for example, continually refused to grant copyright registrations for works generated by AI, even where those works were the product of detailed work on prompts.[12] This is an uneasy position given AI is a prominent and growing feature of creative industries like graphic design and visual arts. The merits of such outputs relative to human-only outputs can be debated; what cannot be debated is that AI can usefully complement human effort to produce interesting, culturally informative and beneficial contributions to knowledge and culture.[13] Discouraging the integration of such technologies by refusing to grant copyright protection is contrary to copyright's rationales of rewarding creators for their labour and driving creativity for the public benefit.[14]

B. Creativity and artificial intelligence: the underlying concern

9 It is clear, therefore, that balanced copyright policymaking concerning AI-generated works must address the very real risks to human creativity that AI has brought, without being too restrictive and stymying the innovation and boost to creativity AI can offer.[15]

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11 Gaétan de Rassenfosse, Adam B Jaffe & Joel Waldfogel, "Intellectual Property and Creative Machines" (2025) 4 *Entrepreneurship and Innovation Policy and the Economy* 47 at 52.

12 See Elias Gantos, "Algorithmic Artistry: The Copyright Office Stands Firm in Its Fourth Refusal to Register AI Generated Works", *Syracuse Law Review* (4 January 2024) <https://lawreview.syr.edu/algorithmic-artistry-the-copyright-office-stands-firm-in-its-fourth-refusal-to-register-ai-generated-works/> (accessed 23 September 2025).

13 Gaétan de Rassenfosse, Adam B Jaffe & Joel Waldfogel, "Intellectual Property and Creative Machines" (2025) 4 *Entrepreneurship and Innovation Policy and the Economy* 47 at 59–60; Keith Kirkpatrick, "Can AI Demonstrate Creativity?" (2023) 66(2) *Communications of the ACM* 21 at 23; Manuel B Garcia, "The Paradox of Artificial Creativity: Challenges and Opportunities of Generative AI Artistry" (2024) *Creativity Research Journal* 1; Giorgio Franceschelli & Mirco Musolesi, "On the Creativity of Large Language Models" (2025) 40 *AI & Society* 3785; Tuhin Chakrabarty *et al*, "Creativity Support in the Age of Large Language Models: An Empirical Study Involving Professional Writers" (2024) *C&C '24: Proceedings of the 16th Conference on Creativity & Cognition* 132; Julija Kalpokienė, *Law, Human Creativity and Generative Artificial Intelligence* (Routledge, 2024) at p 106.

14 See generally Mark Fenwick & Paulius Jurcys, "Originality and the Future of Copyright in an Age of Generative AI" (2023) 51 *Computer Law & Security Review* 105892 at p 12.

15 Christophe Geiger, 'Elaborating a Human Rights-Friendly Copyright Framework for Generative AI' (2024) 55 *IIC – International Review of Intellectual Property and Competition Law* 1129 at 1155–1156.

10 Key to achieving this balance is to understand whether AI should be considered "creative" in its own right, as distinct from being merely a tool wielded by a creative human. If AI is merely a tool, like graphic design software, cameras or stationery, then copyright law should, in theory, treat outputs generated by AI no differently than it treats outputs generated by humans using those other tools: they are tools, and the resulting copyright should be owned by those who wield the tools with the same scope (*eg*, duration) as any other works.

11 Yet if AI is distinctly "creative" in its processes in a way that appropriates the *locus* of creative labour from the human mind, copyright law should treat the resulting outputs with caution, perhaps with little or no protection, because copyright law's goal is to cultivate human creativity.[16] Of course, recognising AI as "creative" could lead to discussions about whether *authorship* should be attributed to AI under copyright law, which may have consequences for the ownership and transfer of copyright's economic rights.[17]

12 These tensions show that it is critical to understand whether AI can create, or whether it is still within the bounds of human cognitive processes. To ask the question another way: "Is there something in the human creative process that makes it unique and different from any output generated by a machine?"[18]

13 Note that this is a slightly different perspective to the "AI-generated"/"AI-assisted" dichotomy, which is about whether AI is *used* as a tool with the human still at the centre.[19] That debate is valuable

16 See also the conceptualisation of the related problem of output indistinguishability in Gaétan de Rassenfosse, Adam B Jaffe & Joel Waldfogel, "Intellectual Property and Creative Machines" (2025) 4 *Entrepreneurship and Innovation Policy and the Economy* 47 at 65.

17 See further Cheng Lim Saw & Duncan Lim, "The Case for AI Authorship in Copyright Law" 18(1) *Law, Innovation and Technology* (forthcoming, 2026) <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=5108423> (accessed 23 September 2025). A detailed treatise of authorship is beyond the scope of this article, which is mainly concerned with the attribution of economic rights arising from AI works, which relates to ownership of works rather than authorship (in the same way that works generated by employees, though those employees are the authors, are considered owned by the companies under copyright law). See, *eg*, Copyright, Designs and Patents Act 1988 (c 48) (UK) s 11(2).

18 Christophe Geiger, "When the Robots (Try to) Take Over: Of Artificial Intelligence, Authors, Creativity and Copyright Protection" in *Kreation Innovation Märkte – Creation Innovation Markets: Festschrift Reto M Hilty* (Florent Thouvenin *et al* eds) (Springer Verlag, 2024) at p 68.

19 P Bernt Hugenholtz & João Pedro Quintais, "Copyright and Artificial Creation: Does EU Copyright Law Protect AI-Assisted Output" (2021) 52 *IIC – International Review of Intellectual Property and Competition Law* 1190 at 1192.

to assessing whether in specific circumstances, works should or should not be protected under existing conceptions of originality in copyright law. However, the debate pursued in this article is at a higher level of abstraction and focuses on the *model*, rather than how it is *used*: whether AI can *ontologically* be regarded as a tool or creative.

14 Focusing on the use appears on its face to be an attractive, streamlined solution.[20] Yet that approach requires case-by-case determinations at the judicial level, which necessarily imports subjectivity and (potentially) inconsistency, to say nothing of the access to justice implications of requiring claimants to bring proceedings that will require detailed technical analyses about how the AI was used. An ontological assessment of AI's capabilities at the higher level will render the use-based approach much less necessary, and perhaps entirely redundant, to the benefit of streamlined justice processes.

15 Having said that, the goal of this article is to begin a discussion, rather than provide the final word, on the question of AI creativity. The literature on AI and creativity is vast, and space prohibits a detailed account of that scholarship. Nevertheless, the subfield of creativity research is a rich seam from which to draw out a theoretical framework against which to assess AI's creative capacities.

16 Historically, copyright scholars have examined that subfield in the context of generally seeking to enhance copyright law, given the insights it provides into human creative behaviour (*eg*, motivations, influential factors, *etc*) from psychology, neuroscience and other scientific fields.[21] However, creativity research has received relatively little attention in the copyright scholarship attempting to engage AI with copyright law, especially since ChatGPT launched generative AI into public consciousness in late 2022.[22] Applying creativity research

20 See, *eg*, Claudio Novelli *et al*, "Generative AI in EU Law: Liability, Privacy, Intellectual Property, and Cybersecurity" (2024) 55 *Computer Law & Security Review* 106066 at p 11.

21 See, *eg*, Gregory Mandel, 'To Promote the Creative Process: Intellectual Property Law and the Psychology of Creativity" (2011) 86(5) *Notre Dame Law Review* 1999; Erez Reuveni, "Copyright, Neuroscience, and Creativity" (2013) 64(4) *Alabama Law Review* 735; Jeanne C Fromer, "A Psychology of Intellectual Property" (2010) 104(4) *Northwestern University Law Review* 1441; Omri Rachum-Twaig, "The Cognitive Aspects of Creativity" in *Copyright Law and Derivative Works: Regulating Creativity* (Routledge, 2018).

22 At the time of writing, one of the most recent and comprehensive examinations of this question can be found in Christian E Mammen *et al*, "Creativity, Artificial Intelligence, and the Requirement of Human Authors and Inventors in Copyright and Patent Law" (White Paper, Oxford University, July 2024) at pp 14–21. Note that much of the copyright-creativity scholarship is in the context of the US's

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can help copyright policymakers critically evaluate the idea, receiving traction among computer scientists and artists, that AI can be creative.[23] This analysis is undertaken below by developing a theoretical framework to assess AI's "creative" capacities, which in turn, can usefully inform how copyright policymakers should approach the protectability of AI-generated works under copyright law.[24]

III. Creativity research in context

A. The history of creativity as an academic concept

17 The concept of creativity emerged in the modern era, though creativity itself must be understood in the context of human and civilisational history.[25] The first documented reference to "creativity" was from 1875 in relation to William Shakespeare, and "marked a radical change in our understanding of creating: from something that already happened and was out of reach to an ongoing process and, finally, a more generalisable trait or phenomenon".[26] Historically, "how and why we create" could be traced to concepts of the divine,[27] though this shifted to an understanding of creativity as internal over time.[28]

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requirement for works to have a minimal degree of creativity for protection: see, *eg*, Mark Bartholomew, *Intellectual Property and the Brain: How Neuroscience Will Reshape Legal Protection for Creations of the Mind* (Cambridge University Press, 2022).

23 Roosa Wingström, Johanna Hautala & Riina Lundman, "Redefining Creativity in the Era of AI? Perspectives of Computer Scientists and New Media Artists" (2022) 36(2) *Creativity Research Journal* 177 at 188.

24 However, the author does not intend to synthesise the entire body of creativity scholarship, as this is an endeavour even leading creativity scholars have not found possible: James C Kaufman & Vlad P Glăveanu, "A Review of Creativity Theories: What Questions Are We Trying to Answer?" in *The Cambridge Handbook of Creativity* (James C Kaufman & Robert J Sternberg eds) (Cambridge University Press, 2nd Ed, 2019) at p 27.

25 Vlad P Glăveanu & James C Kaufman, "Creativity: A Historical Perspective" in *The Cambridge Handbook of Creativity* (James C Kaufman & Robert J Sternberg eds) (Cambridge University Press, 2nd Ed, 2019) at p 9.

26 Vlad P Glăveanu & James C Kaufman, "Creativity: A Historical Perspective" in *The Cambridge Handbook of Creativity* (James C Kaufman & Robert J Sternberg eds) (Cambridge University Press, 2nd Ed, 2019) at p 11.

27 See, *eg*, Andreas Fink, Corinna Perchtold & Christian Rominger, "Creativity and Cognitive Control in the Cognitive and Affective Domains" in *The Cambridge Handbook of the Neuroscience of Creativity* (Rex E Jung & Oshin Vartanian (eds) (Cambridge University Press, 2018) at p 318.

28 Vlad P Glăveanu & James C Kaufman, "Creativity: A Historical Perspective" in *The Cambridge Handbook of Creativity* (James C Kaufman & Robert J Sternberg eds) (Cambridge University Press, 2nd Ed, 2019) at p 12.

18 Creativity itself, though, was rarely studied scientifically up to the first half of the 20th century.[29] This changed in 1950, when Joy Paul Guilford encouraged "psychological research into creativity".[30] This call spurred what has now become the body of research focused on creativity, referred to alternately hereon as creativity study/creativity science/creativity research.[31]

B. Defining creativity

19 Piffer firmly argues that "[h]aving a clear definition of creativity is a fundamental starting point for any discussion or study involving [creativity]".[32] Yet creativity has proven difficult to define even for scholars in the field.[33] As Kaufman and Sternberg write:[34]

> There is no (successful or widely accepted) grand theory of creativity that takes into account every possible question, variable, or approach … Nor, truly, is there any particular need for one. *Creativity is so complex and multifaceted that*

29 Mark A Runco & Selcuk Acar, "Divergent Thinking" in *The Cambridge Handbook of Creativity* (James C Kaufman & Robert J Sternberg eds) (Cambridge University Press, 2nd Ed, 2019) at p 224.

30 Hansika Kapoor & James C Kaufman, "Basic Concepts of Creativity" in *The Cambridge Handbook of Lifespan Development of Creativity* (Sandra W Russ, Jessica D Hoffmann & James C Kaufman eds) (Cambridge University Press, 2021) at pg 5.

31 Vlad P Glăveanu & James C Kaufman, "Creativity: A Historical Perspective" in *The Cambridge Handbook of Creativity* (James C Kaufman & Robert J Sternberg eds) (Cambridge University Press, 2nd Ed, 2019) at p 12; James C Kaufman & Vlad P Glăveanu, "A Review of Creativity Theories: What Questions Are We Trying to Answer?" in *The Cambridge Handbook of Creativity* (James C Kaufman & Robert J Sternberg eds) (Cambridge University Press, 2nd Ed, 2019) at p 27; Hansika Kapoor & James C Kaufman, "Basic Concepts of Creativity" in *The Cambridge Handbook of Lifespan Development of Creativity* (Sandra W Russ, Jessica D Hoffmann & James C Kaufman eds) (Cambridge University Press, 2021) at p 5.

32 Davide Piffer, "The Genetics of Creativity: The Underdog of Behavior Genetics?" in *The Cambridge Handbook of the Neuroscience of Creativity* (Rex E Jung & Oshin Vartanian eds) (Cambridge University Press, 2018) at p 437.

33 See, *eg*, Adam Green, "Creativity in the Distance: The Neurocognition of Semantically Distant Relational Thinking and Reasoning" in *The Cambridge Handbook of the Neuroscience of Creativity* (Rex E Jung & Oshin Vartanian eds) (Cambridge University Press, 2018) at p 366; Marc H Bornstein, "Creativity Across the Lifespan" in *The Cambridge Handbook of Lifespan Development of Creativity* (Sandra W Russ, Jessica D Hoffmann & James C Kaufman eds) (Cambridge University Press, 2021) at p 64.

34 James C Kaufman & Vlad P Glăveanu, "A Review of Creativity Theories: What Questions Are We Trying to Answer?" in *The Cambridge Handbook of Creativity* (James C Kaufman & Robert J Sternberg eds) (Cambridge University Press, 2nd Ed, 2019) at p 38; see also Davide Piffer, "The Genetics of Creativity: The Underdog of Behavior Genetics?" in *The Cambridge Handbook of the Neuroscience of Creativity* (Rex E Jung & Oshin Vartanian eds) (Cambridge University Press, 2018) at p 437.

> *any theory that tried to explain everything would be unwieldy to the point of being incomprehensible*. [emphasis added]

20 Indeed, Veale, Cardoso and Pérez y Pérez suggest that definitions focusing on particular domains (*eg*, science) "are unlikely to do justice to other areas".[35] A study of scientist and artist perspectives on creativity suggested fundamental differences as to the "process and outcome" of creativity: whereas the scientists interviewed indicated that creativity "is aimed at producing outcomes approved as knowledge … artists often defined creativity from their personal perspectives on the creation process, which they described based on feelings, practices, past experiences, and exploration".[36] The problem has proven so pressing that "some authors have even suggested abandoning the term *creativity* altogether" [emphasis added].[37]

21 Scholars *have*, however, coalesced around shared elements of creativity, usually centred around the *product* of mental processes.[38] One longstanding approach has been to adopt a twofold model, broadly covering the novelty and utility of output.[39] As Green writes, "[n]ovelty connotes the divergence of a creative product from what is standard or what is expected [while] [u]sefulness indicates the meaningfulness/sensibility of a creative product with respect to the context in which it is generated".[40] These can also be conceptualised as

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35 Tony Veale, F Amílcar Cardoso & Rafael Pérez y Pérez, "Systematizing Creativity: A Computational View" in *Computational Creativity: The Philosophy and Engineering of Autonomously Creative Systems* (Springer, 2019) at p 2.

36 Roosa Wingström, Johanna Hautala & Riina Lundman, "Redefining Creativity in the Era of AI? Perspectives of Computer Scientists and New Media Artists" (2022) 36(2) *Creativity Research Journal* 177 at 185.

37 Simon Kyaga, "A Heated Debate: Time to Address the Underpinnings of the Association between Creativity and Psychopathology?" in *The Cambridge Handbook of the Neuroscience of Creativity* (Rex E Jung & Oshin Vartanian eds) (Cambridge University Press, 2018) at p 127 citing M A Runco, *Creativity: Theories and Themes: Research, Development, and Practice* (Elsevier, 2007).

38 See, *eg*, Marion Botella, "Emotions Across the Creative Process and Across Domains of Creativity" in *The Cambridge Handbook of Creativity and Emotions* (Zorana Ivcevic, Jessica D Hoffmann & James C Kaufman eds) (Cambridge University Press, 2023) at p 205.

39 Shelley H Carson, "Creativity and Psychopathology: A Relationship of Shared Neurocognitive Vulnerabilities" in *The Cambridge Handbook of the Neuroscience of Creativity* (Rex E Jung & Oshin Vartanian eds) (Cambridge University Press, 2018) at p 136, citing F Barron, *Creative Person and Creative Process* (Holt, Rinehart and Winston, 1969); Darya L Zabelina, "Attention and Creativity" in *The Cambridge Handbook of the Neuroscience of Creativity* (Rex E Jung & Oshin Vartanian eds) (Cambridge University Press, 2018) at p 161, citing R J Sternberg & T I Lubart, *Handbook of Creativity* (Cambridge University Press, 1999).

40 Adam Green, "Creativity in the Distance: The Neurocognition of Semantically Distant Relational Thinking and Reasoning" in *The Cambridge Handbook of the Neuroscience*

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"originality and effectiveness … Originality … represents the novelty of the outcome [while] the idea also needs to have value, worth, or use in a given context".[41] Green adopts similar definitions: The twofold approach is broadly accepted as a "definition of creativity [that] has stood the test of time, with few (if any) modifications being suggested over the years".[42]

22 Scholars have developed and added to these factors, though, leaving the exact scope of any best-practice definition uncertain. For some, assessing the process of creativity must involve considering the social context in which the individual person is creating.[43] This could, for example, "refer to an explicit or implicit set of rules or standards (for example, certain types of musical creativity are more appropriate in a classical context relative to a rock or jazz context), or a social or professional setting where particular behaviors or ideas are valued and evaluated".[44]

23 Other scholars have adopted additional or alternative metrics. Simonton, for example, argues that creativity must be "surprising",[45] and that all three factors are "necessary but not sufficient … an utterly useless idea cannot be creative no matter how original and surprising – such as constructing a bank vault out of cellophane".[46] Margaret Boden's influential definition of creativity also includes surprise: it is "the ability

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of Creativity (Rex E Jung & Oshin Vartanian eds) (Cambridge University Press, 2018) at p 366; see also Oshin Vartanian, "Openness to Experience: Insights From Personality Neuroscience" in *The Cambridge Handbook of the Neuroscience of Creativity* (Rex E Jung & Oshin Vartanian eds) (Cambridge University Press, 2018) at p 465.

41 Hansika Kapoor & James C Kaufman, "Basic Concepts of Creativity" in *The Cambridge Handbook of Lifespan Development of Creativity* (Sandra W Russ, Jessica D Hoffmann & James C Kaufman eds) (Cambridge University Press, 2021) at p 6.

42 Hansika Kapoor & James C Kaufman, "Basic Concepts of Creativity" in *The Cambridge Handbook of Lifespan Development of Creativity* (Sandra W Russ, Jessica D Hoffmann & James C Kaufman eds) (Cambridge University Press, 2021) at p 6.

43 Indre V Viskontas, "Training to Be Creative: The Interplay Between Cognition, Skill Learning, and Motivation" in *The Cambridge Handbook of the Neuroscience of Creativity* (Rex E Jung & Oshin Vartanian eds) (Cambridge University Press, 2018) at p 405.

44 Malinda J McPherson & Charles J Limb, "Artistic and Aesthetic Production: Progress and Limitations" in *The Cambridge Handbook of the Neuroscience of Creativity* (Rex E Jung & Oshin Vartanian eds) (Cambridge University Press, 2018) at p 517.

45 Dean Keith Simonton, "Creative Ideas and the Creative Process: Good News and Bad News for the Neuroscience of Creativity" in *The Cambridge Handbook of the Neuroscience of Creativity* (Rex E Jung & Oshin Vartanian eds) (Cambridge University Press, 2018) at p 10.

46 Dean Keith Simonton, "Creative Ideas and the Creative Process: Good News and Bad News for the Neuroscience of Creativity" in *The Cambridge Handbook of*

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to come up with ideas or artifacts that are new, surprising and valuable".[47] Marron and Faust even suggest there are four factors: "a creative idea can be defined as a solution that is novel and unique, and that is also adequate and useful".[48] Heilman and Fischler go beyond factors, arguing that creativity is about finding unity in that which is disordered, or "a new understanding or novel development and systematic expression of orderly relationships (finding the 'thread that unites' …)".[49] And Kapoor and Mange suggest creativity, hitherto conceptualised as a positive force, should also be understood in terms of its ability to produce negative outcomes.[50]

24 The focus on the product, rather than the process, of creativity in defining it is not wholesale. Saban-Bezalel and Mashal conceptualise creativity by looking at the *process* of problem-solving, rather than the *product* of that process: "divergent thinking that solves unforeseen and abstract problems in a novel and adaptive manner".[51] Similarly, Madrid, Patterson and Ibaceta focus on problem-solving: "Creativity is a complex endeavor … involv[ing] identifying problems and envisioning new opportunities in the environment, leading to the generation of novel ideas."[52] And Plucker *et al* emphasise contextual factors in their definition: "the interaction among attitude, process and environment by which an individual or group produces a perceptible product that is both novel and useful as defined within a social context" [emphasis in

the Neuroscience of Creativity (Rex E Jung & Oshin Vartanian eds) (Cambridge University Press, 2018) at p 10.

47 Margaret A Boden, *The Creative Mind: Myths and Mechanisms* (Routledge, 2nd Ed, 2004) at p 1, cited in Giorgio Franceschelli & Mirco Musolesi, "On the Creativity of Large Language Models" (2025) 40 *AI & Society* 3785.

48 Tali R Marron & Miriam Faust, "Free Association, Divergent Thinking, and Creativity: Cognitive and Neural Perspectives" in *The Cambridge Handbook of the Neuroscience of Creativity* (Rex E Jung & Oshin Vartanian eds) (Cambridge University Press, 2018) at p 264.

49 Kenneth M Heilman & Ira S Fischler, "Creativity and the Aging Brain" in *The Cambridge Handbook of the Neuroscience of Creativity* (Rex E Jung & Oshin Vartanian eds) (Cambridge University Press, 2018) at p 476.

50 Hansika Kapoor & Urvi Mange, "Affective Factors in Dark Creativity" in *The Cambridge Handbook of Creativity and Emotions* (Zorana Ivcevic, Jessica D Hoffmann & James C Kaufman eds) (Cambridge University Press, 2023) at p 340.

51 Ronit Saban-Bezalel & Nira Mashal, "Figurative Language Comprehension and Laterality in Autism Spectrum Disorder" in *The Cambridge Handbook of the Neuroscience of Creativity* (Rex E Jung & Oshin Vartanian eds) (Cambridge University Press, 2018) at p 287.

52 Hector Madrid, Malcolm Patterson & Miguel Ibaceta, "Affective States and Creativity" in *The Cambridge Handbook of Creativity and Emotions* (Zorana Ivcevic, Jessica D Hoffmann & James C Kaufman eds) (Cambridge University Press, 2023) at p 87.

original omitted].[53] Meanwhile, care must be taken not to associate the assessment of the product too readily with impact, as Piffer writes:[54]

> Impact (that is, the trace that is left on a particular field or on the culture in general) is not a necessary prerequisite for a product to be creative. Arguably, the vast majority of original and adaptive behaviors and activities that people perform during their daily lives leave no discernible impact on the culture as a whole and are never 'published' in the traditional sense, yet they deserve to be considered creative … In theory, there could be many Einsteins or Picassos that never had their work published, yet their work might be as creative as that of their more popular counterparts.

25 The most recent attempt (at the time of writing) to deal directly with the question of defining creativity in the face of AI is by Mark Runco, who argues that creativity's "standard definition" – focusing on "originality and effectiveness" – should be updated to include authenticity and intentionality as additional elements.[55] Doing so, Runco argues, will enable a clear delineation between "artificial creativity of computers, which may be original and effective, from human creativity, which is *more than just original and effective*" [emphasis added].[56]

26 The above overview demonstrates the difficulty of defining creativity, and it is beyond the scope of this article to exhaustively reconcile them. While Runco's argument is certainly persuasive and directly addresses AI creativity, its recency makes it prudent to await scholarly interrogation in the creativity community. To that end, Jauk's definition of creativity has been adapted to best integrate the elements discussed: "Creativity, in terms of cognitive creative potential, is commonly defined in terms of the ability to produce novel … useful … [surprising/unique and adequate] ideas."[57]

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53 Jonathan A Plucker, Ronald A Beghetto & Gayle T Dow, "Why Isn't Creativity More Important to Educational Psychologists? Potentials, Pitfalls, and Future Directions in Creativity Research" (2004) 39(2) *Educational Psychologist* 83 at 90, cited in Zorana Ivcevic, "Emotion Traits and Creativity" in *The Cambridge Handbook of Creativity and Emotions* (Zorana Ivcevic, Jessica D Hoffmann & James C Kaufman eds) (Cambridge University Press, 2023) at p 223.

54 Davide Piffer, "The Genetics of Creativity: The Underdog of Behavior Genetics?" in *The Cambridge Handbook of the Neuroscience of Creativity* (Rex E Jung & Oshin Vartanian eds) (Cambridge University Press, 2018) at pp 437–438.

55 Mark A Runco, "Updating the Standard Definition of Creativity to Account for the Artificial Creativity of AI" (2025) 37(1) *Creativity Research Journal* 1 at 1 and 4.

56 Mark A Runco, "Updating the Standard Definition of Creativity to Account for the Artificial Creativity of AI" (2025) 37(1) *Creativity Research Journal* 1 at 4.

57 Emanuel Jauk, "Intelligence and Creativity From the Neuroscience Perspective" in *The Cambridge Handbook of the Neuroscience of Creativity* (Rex E Jung & Oshin Vartanian eds) (Cambridge University Press, 2018) at p 421.

IV. Creativity research: anthropocentric?

A. Creativity research's source-agnosticism

27 In none of the conceptualisations of creativity above, do the elements, in and of themselves, necessitate human origination. A large language model could very well generate something novel which has not been created before. This has been the focus of longstanding attempts by Dr Stephen Thaler to register patents in respect of "inventions" generated by AI. Though these attempts have *largely* been unsuccessful (with one notable exception in Germany), it is not because they fail the novelty requirements of patent law, but because he attempts to give authorial or inventor credit to the AI rather than himself, which patent law in a range of countries has proven resistant to.[58]

28 The works generated by AI may also have value in and of themselves in a range of applications, and they can also be "surprising". Further, creativity is also not necessarily a biological or neurological process, but an observed phenomenon: "[I]f the [neuroscientist] wishes to identify *the* cerebral locus of creative ideas, that quest is necessarily quixotic. … Nothing in the brain produces creativity like a gland secretes a hormone."[59] This means creativity does not necessarily presume a biological basis, let alone one unique to the human brain. Theoretically, then, if the product meets the criteria for creativity, then its originator can be said to have "created". It is therefore unsurprising that the idea that AI can be creative has received traction among computer scientists and artists.[60]

58 Johanna Gibson, "People or Patents, Inventors or Owners: Why the Supreme Court Decision on Artificial Intelligence and Invention in *Thaler* is Significant for All Intellectual Property" (2024) 14(1) *Queen Mary Journal of Intellectual Property* 1; Rita Matulionyte, "'AI is Not an Inventor': *Thaler v Comptroller of Patents, Designs and Trademarks* and the Patentability of AI Inventions" (2025) 88(1) *Modern Law Review* 205; Michelle Lavrichenko, "*Thaler v Vidal*: Artificial Intelligence – Can the Invented Become the Inventor?" (2022) 44(2) *Cardozo Law Review* 699.

59 Dean Keith Simonton, "Creative Ideas and the Creative Process: Good News and Bad News for the Neuroscience of Creativity" in *The Cambridge Handbook of the Neuroscience of Creativity* (Rex E Jung & Oshin Vartanian eds) (Cambridge University Press, 2018) at p 16.

60 Roosa Wingström, Johanna Hautala & Riina Lundman, "Redefining Creativity in the Era of AI? Perspectives of Computer Scientists and New Media Artists" (2022) 36(2) *Creativity Research Journal* 177 at 188.

B. Human-centric models of creativity

29 While scholars' approaches to defining creativity may appear source-agnostic, dominant models of creativity focus more on the creativity of *people*. For example, Rhodes's 1961 Four Ps model of creativity involves "person, process, product, and press".[61] Here, "[t]he person represents the individual who is creative, including their personality, characteristics, attitudes, and temperament".[62] Even the process step "refers to the cognitive, motivational, socioemotional, and neuroscientific processes that underlie creative expression".[63]

30 Glăveanu's Five As model is similar ("actor, action, artifact, audience, affordances"), but further emphasises the human nature of the creator by involving a consideration of their "past socialization and social history … [as t]he actor is not an isolated being but an entity embedded in and shaped by societal contexts within which creativity emerges".[64]

31 Meanwhile, the Four Cs theory of creativity is a developmental trajectory of the creative process. It begins when a person has "an insight that is personally meaningful and new to [them]" (mini-c), develops into an idea others consider creative on development based on "appropriate feedback and guidance", develops further when that person hones their creative craft to the degree of being "considered a true creative professional or expert", and in some occasions morphs into era-defining creativity if that person is a genius.[65] While there are many more models of creativity addressing issues like the necessary elements for creativity, motivations

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61 Hansika Kapoor & James C Kaufman, "Basic Concepts of Creativity" in *The Cambridge Handbook of Lifespan Development of Creativity* (Sandra W Russ, Jessica D Hoffmann & James C Kaufman eds) (Cambridge University Press, 2021) at p 6, citing Mel Rhodes, "An Analysis of Creativity" (1961) 42(7) *The Phi Delta Kappan* 305.

62 Hansika Kapoor & James C Kaufman, "Basic Concepts of Creativity" in *The Cambridge Handbook of Lifespan Development of Creativity* (Sandra W Russ, Jessica D Hoffmann & James C Kaufman eds) (Cambridge University Press, 2021) at p 6.

63 Hansika Kapoor & James C Kaufman, "Basic Concepts of Creativity" in *The Cambridge Handbook of Lifespan Development of Creativity* (Sandra W Russ, Jessica D Hoffmann & James C Kaufman eds) (Cambridge University Press, 2021) at p 6.

64 Hansika Kapoor & James C Kaufman, "Basic Concepts of Creativity" in *The Cambridge Handbook of Lifespan Development of Creativity* (Sandra W Russ, Jessica D Hoffmann & James C Kaufman eds) (Cambridge University Press, 2021) at p 7.

65 James C Kaufman & Vlad P Glăveanu, "A Review of Creativity Theories: What Questions Are We Trying to Answer?" in *The Cambridge Handbook of Creativity* (James C Kaufman & Robert J Sternberg eds) (Cambridge University Press, 2nd Ed, 2019) at p 28.

for creativity, methods for creativity and collaborative creativity,[66] they broadly adopt a human-centric focus.

C. Anthropocentric subdisciplines of creativity research

32 It is not just the models of creativity that display an anthropocentric focus. Various subdisciplines making up creativity research demonstrate a similar emphasis.

(1) Genetic studies

33 Genetic studies involve analysing the sources and contours of creativity, with Barbot and Eff concluding that "[e]very human has the genetic background that makes creativity possible and that made humanity evolve over time".[67] Care must obviously be taken given the early stages of research into genetics and creativity.[68] But even in issuing this warning, Piffer emphasises the human focus of creativity: [69]

> High creativity (and possibly even genius) is not the result of a single cognitive or personality factor. Rather, it is the product of a combination of *personality* (e.g., openness to experience, novelty-seeking, assertiveness or ego-strength, risk-taking), subclinical (e.g., psychoticism, schizotypy), and cognitive (e.g., DT, general intelligence) traits that contribute additively or interact to increase the probability that an individual will make a more or less lasting contribution to the culture. [emphasis added]

(2) Psychology

34 The psychological subfield of how to assess creativity depends largely on psychometric methods to investigate "creative processes, personality and behavioral correlates of creativity, characteristics of creative products, and attributes of creativity-fostering environments",[70]

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66 See generally James C Kaufman & Vlad P Glăveanu, "A Review of Creativity Theories: What Questions Are We Trying to Answer?" in *The Cambridge Handbook of Creativity* (James C Kaufman & Robert J Sternberg eds) (Cambridge University Press, 2nd Ed, 2019).

67 Baptiste Barbot & Henry Eff, "The Genetic Basis of Creativity" in *The Cambridge Handbook of Creativity* (James C Kaufman & Robert J Sternberg eds) (Cambridge University Press, 2nd Ed, 2019) at p 142.

68 Davide Piffer, "The Genetics of Creativity: The Underdog of Behavior Genetics?" in *The Cambridge Handbook of the Neuroscience of Creativity* (Rex E Jung & Oshin Vartanian eds) (Cambridge University Press, 2018) at p 446.

69 Davide Piffer, "The Genetics of Creativity: The Underdog of Behavior Genetics?" in *The Cambridge Handbook of the Neuroscience of Creativity* (Rex E Jung & Oshin Vartanian eds) (Cambridge University Press, 2018) at p 437.

70 Jonathan A Plucker, Matthew C Makel & Meihua Qian, "Assessment of Creativity" in *The Cambridge Handbook of Creativity* (James C Kaufman & Robert J Sternberg *(cont'd on the next page)*

which are entirely human-centric. One dominant category of creativity tests is divergent thinking tests, where a person is given stimuli and expected "to generate as many ideas or uses as possible".[71]

35 Research on how to enhance creativity in this subfield also focuses on the person. For example, Marron and Faust examine how the relationship between free association – spontaneous responses or "mind wandering" – and creativity can help inform "training that encourages free association, and that aims to help the individual to engage in more flexible associations, [which] may assist in overcoming internal inhibition and thought rigidity, ultimately enhancing creative thinking".[72] Viskontas examines how creativity can be effectively trained and the factors that indicate success in that training, again on the presumption that the creator is a human person.[73]

36 Meanwhile, there is an entire subcategory of psychological creativity research devoted to the emotions.[74] Underlying this subcategory is the conviction that emotions, conventionally understood as experienced by humans, "matter for creativity".[75] A large body of literature, for example, suggests that positive affect drives creativity: "when feeling enthusiastic, joyful, and inspired, individuals are prone to think in an unconventional way and generate novel ideas to solve problems or take advantage of new

eds) (Cambridge University Press, 2nd Ed, 2019) at p 45; see also Darya L Zabelina, "Attention and Creativity" in *The Cambridge Handbook of the Neuroscience of Creativity* (Rex E Jung & Oshin Vartanian eds) (Cambridge University Press, 2018) at pp 161-162.

71 Hikaru Takeuchi & Ryuta Kawashima, "Structural Studies of Creativity Measured by Divergent Thinking" in *The Cambridge Handbook of the Neuroscience of Creativity* (Rex E Jung & Oshin Vartanian eds) (Cambridge University Press, 2018) at p 451.

72 Tali R Marron & Miriam Faust, "Free Association, Divergent Thinking, and Creativity: Cognitive and Neural Perspectives" in *The Cambridge Handbook of the Neuroscience of Creativity* (Rex E Jung & Oshin Vartanian eds) (Cambridge University Press, 2018) at p 274.

73 Indre V Viskontas, "Training to be Creative: The Interplay between Cognition, Skill Learning, and Motivation" in *The Cambridge Handbook of the Neuroscience of Creativity* (Rex E Jung & Oshin Vartanian eds) (Cambridge University Press, 2018) at p 416.

74 See generally Zorana Ivcevic, Jessica D Hoffmann & James C Kaufman (eds) *The Cambridge Handbook of Creativity and Emotions* (Cambridge University Press, 2023).

75 Zorana Ivcevic, "Emotion Traits and Creativity" in *The Cambridge Handbook of Creativity and Emotions* (Zorana Ivcevic, Jessica D Hoffmann & James C Kaufman eds) (Cambridge University Press, 2023) at p 223.

opportunities to reach desired goals".[76] Yet both positive and negative emotions could drive creativity, given how "complex" creativity is.[77]

37 Further links that can be explored in this subfield include the links between emotional intelligence and creativity[78] and how the differences between men and women in the context of emotions can influence creativity.[79]

(3) Neuroscience

38 Neuroscience has also been applied to the study of creativity, with different focuses like the intersection of stress and creativity,[80] the impact on psychedelic consumption and creativity,[81] the relationship between creativity and mental illness,[82] and the neurological links between

76 Hector Madrid, Malcolm Patterson & Miguel Ibaceta, "Affective States and Creativity" in *The Cambridge Handbook of Creativity and Emotions* (Zorana Ivcevic, Jessica D Hoffmann & James C Kaufman eds) (Cambridge University Press, 2023) at p 88; Marion Botella, "Emotions Across the Creative Process and Across Domains of Creativity" in *The Cambridge Handbook of Creativity and Emotions* (Zorana Ivcevic, Jessica D Hoffmann & James C Kaufman eds) (Cambridge University Press, 2023) at p 215.

77 Marie Forgeard, "Motivations, Emotions, and Creativity" in *The Cambridge Handbook of Creativity and Emotions* (Zorana Ivcevic, Jessica D Hoffmann & James C Kaufman eds) (Cambridge University Press, 2023) at p 158; see also Marion Botella, "Emotions Across the Creative Process and Across Domains of Creativity" in *The Cambridge Handbook of Creativity and Emotions* (Zorana Ivcevic, Jessica D Hoffmann & James C Kaufman (eds) (Cambridge University Press, 2023) at p 215.

78 Jessica D Hoffmann & Sean McFarland, "Creativity and Emotional Intelligence" in *The Cambridge Handbook of Creativity and Emotions* (Zorana Ivcevic, Jessica D Hoffmann & James C Kaufman eds) (Cambridge University Press, 2023) at pp 198–199.

79 Christa L Taylor, "Gender Differences in Creativity and Emotions" in *The Cambridge Handbook of Creativity and Emotions* (Zorana Ivcevic, Jessica D Hoffmann & James C Kaufman eds) (Cambridge University Press, 2023) at p 253.

80 David Q Beversdorf, "Stress, Pharmacology, and Creativity" in *The Cambridge Handbook of the Neuroscience of Creativity* (Rex E Jung & Oshin Vartanian eds) (Cambridge University Press, 2018).

81 Kieran C R Fox *et al*, "Functional Neuroimaging of Psychedelic Experience: An Overview of Psychological and Neural Effects and Their Relevance to Research on Creativity, Daydreaming, and Dreaming" in *The Cambridge Handbook of the Neuroscience of Creativity* (Rex E Jung & Oshin Vartanian eds) (Cambridge University Press, 2018).

82 Simon Kyaga, "A Heated Debate: Time to Address the Underpinnings of the Association between Creativity and Psychopathology?" in *The Cambridge Handbook of the Neuroscience of Creativity* (Rex E Jung & Oshin Vartanian eds) (Cambridge University Press, 2018); Shelley H Carson, "Creativity and Psychopathology: A Relationship of Shared Neurocognitive Vulnerabilities" in *The Cambridge Handbook of the Neuroscience of Creativity* (Rex E Jung & Oshin Vartanian eds) (Cambridge University Press, 2018); Ronit Saban-Bezalel & Nira Mashal, "Figurative Language Comprehension and Laterality in Autism Spectrum Disorder"

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emotions and creative output.[83] There are also different substantive focuses on creativity within neuroscience, such as the exploration of creativity in music and the arts.[84]

39 Neuroscience helps identify the extent to which brain features contradict creativity psychology, and "to offer better mechanistic explanations of some of the core constructs that drive research in the psychology of creativity".[85] Neuroscience can also challenge propensities to treat creativity as "inherently mysterious, magical, and ineffable", and "to readily accept or lean toward vague and tenuous explanations that fit with such expectations" about creativity.[86] For instance, neuroimaging studies have suggested links between the rostrolateral prefrontal cortices and relational reasoning ("a process required for generating novel associations between concepts – an important aspect of creativity") and between "inferior frontal activity" and "inhibitory processes that suppress inappropriate responses".[87] Another review suggested a link between brain white matter volume and creativity as measured by divergent thinking, which "support[s] … the theoretically hypothesized importance of brain structural connectivity in creativity".[88]

40 Neuroscience, as a subset of creativity study, definitionally presumes creativity is a product of the human brain. As Benedek writes, "[c]reative thought involves the generation of complex mental

in *The Cambridge Handbook of the Neuroscience of Creativity* (Rex E Jung & Oshin Vartanian eds) (Cambridge University Press, 2018) at p 287.

83 See Evangelia G Chrysikou, Alexandra E Kelly & Indre V Viskontas, "The Neuroscience of Creativity and Emotions" in *The Cambridge Handbook of Creativity and Emotions* (Zorana Ivcevic, Jessica D Hoffmann & James C Kaufman eds) (Cambridge University Press, 2023) at p 109.

84 David Bashwiner, "The Neuroscience of Musical Creativity" in *The Cambridge Handbook of the Neuroscience of Creativity* (Rex E Jung & Oshin Vartanian eds) (Cambridge University Press, 2018); Malinda J McPherson & Charles J Limb, "Artistic and Aesthetic Production: Progress and Limitations" in *The Cambridge Handbook of the Neuroscience of Creativity* (Rex E Jung & Oshin Vartanian eds) (Cambridge University Press, 2018).

85 Oshin Vartanian, "Neuroscience of Creativity" in *The Cambridge Handbook of Creativity* (James C Kaufman & Robert J Sternberg eds) (Cambridge University Press, 2nd Ed, 2019) at pp 149–150.

86 Anna Abraham, "The Forest Versus the Trees: Creativity, Cognition and Imagination" in *The Cambridge Handbook of the Neuroscience of Creativity* (Rex E Jung & Oshin Vartanian eds) (Cambridge University Press, 2018) at p 195.

87 Reece P Roberts & Donna Rose Addis, "A Common Mode of Processing Governing Divergent Thinking and Future Imagination" in *The Cambridge Handbook of the Neuroscience of Creativity* (Rex E Jung & Oshin Vartanian eds) (Cambridge University Press, 2018) at p 214.

88 Hikaru Takeuchi & Ryuta Kawashima, "Structural Studies of Creativity Measured by Divergent Thinking" in *The Cambridge Handbook of the Neuroscience of Creativity* (Rex E Jung & Oshin Vartanian eds) (Cambridge University Press, 2018) at p 451.

representations that need to be maintained over extended periods of time for simulation and elaboration".[89] Chrysikou notes creativity is "associated with the involvement of an extensive network of regions that are widely distributed across the brain, and which reflect the complex set of diverse cognitive processes involved in creative cognition".[90] And Vartanian suggests personality plays a dominant role in creativity, requiring further study as to the interaction between the two at both a theoretical and empirical level.[91]

41 Thus, neuroscience can provide insights into what causes creativity in the human brain from a physiological perspective.[92] However, methodological concerns, and others like concerns about results interpretation, mean neuroscience should not be considered the be-all and end-all of creativity study[93] (though its insights are still incredibly valuable as a subset of that field of inquiry).

D. Creativity research's anthropocentric focus

42 Creativity scholars, whether from psychology, neuroscience, genetics or anthropology, are open about the anthropocentric nature of their work in various ways. Some directly state the premise that creativity is the inherent preserve of humanity. For example, Barbot and Eff call creativity a "human ability",[94] while Garcia-Vega and Walsh explain that creativity is "an everyday human activity which occasionally extends

89 Mathias Benedek, "Internally Directed Attention in Creative Cognition" in *The Cambridge Handbook of the Neuroscience of Creativity* (Rex E Jung & Oshin Vartanian eds) (Cambridge University Press, 2018) at p 189.

90 Evangelia G Chrysikou, "The Costs and Benefits of Cognitive Control for Creativity" in *The Cambridge Handbook of the Neuroscience of Creativity* (Rex E Jung & Oshin Vartanian eds) (Cambridge University Press, 2018) at p 299.

91 Oshin Vartanian, "Openness to Experience: Insights from Personality Neuroscience" in *The Cambridge Handbook of the Neuroscience of Creativity* (Rex E Jung & Oshin Vartanian eds) (Cambridge University Press, 2018) at pp 464 and 473.

92 See Malinda J McPherson & Charles J Limb, "Artistic and Aesthetic Production: Progress and Limitations" in *The Cambridge Handbook of the Neuroscience of Creativity* (Rex E Jung & Oshin Vartanian eds) (Cambridge University Press, 2018) at p 524.

93 Evangelia G Chrysikou, "The Costs and Benefits of Cognitive Control for Creativity" in *The Cambridge Handbook of the Neuroscience of Creativity* (Rex E Jung & Oshin Vartanian eds) (Cambridge University Press, 2018) at p 299; see also Andreas Fink, Corinna Perchtold & Christian Rominger, "Creativity and Cognitive Control in the Cognitive and Affective Domains" in *The Cambridge Handbook of the Neuroscience of Creativity* (Rex E Jung & Oshin Vartanian eds) (Cambridge University Press, 2018) at p 325.

94 Baptiste Barbot & Henry Eff, "The Genetic Basis of Creativity" in *The Cambridge Handbook of Creativity* (James C Kaufman & Robert J Sternberg eds) (Cambridge University Press, 2nd Ed, 2019) at p 143.

to the exceptional".[95] Heiman and Fischler argue it "is one of the most important of human attributes", for which research must be undertaken "to understand the brain mechanisms that allow humans to be creative, as well as how creativity can be developed and enhanced".[96] And Kane *et al* suggest creativity is "the defining aspect of our species … [as b]eing human is characterized by an innate cognitive capacity for observation, reflection, and creation for the purpose of promoting richness in our lives".[97] Others distinguish human creativity from animal psychology and behaviour:[98]

> Creativity is a characteristically human capacity. Almost all other animals behave according to more-or-less fixed action patterns representing immediate responses to the environment. Only a few engage in novel adaptive behaviors … But in assessing creativity across species … such instances pale in comparison to the achievements of *Homo sapiens*.
>
> Creativity is one of a small set of cognitive capacities that clearly differentiate humans from other species. The validity of this statement hinges on how one defines creativity, so we will be clear that we are referring to creativity as the mental capacity and tendency to generate new ideas and products that have some purpose, utility, or worth. There is no question that other species exhibit innovative behaviors that fit that definition ... but the cumulative production of ever more complex concepts and artifacts is unique to humans.

43 Yet others emphasise the social, communal nature of creativity. For example, Lebuda *et al* argue that creativity occurs in social contexts, and cannot be divorced from those contexts: in that sense, "[c]reativity as a sociocultural phenomenon is impossible to separate from interpersonal relationships".[99]

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95 Claudia Garcia-Vega & Vincent Walsh, "Polymathy: The Resurrection of Renaissance Man and the Renaissance Brain" in *The Cambridge Handbook of the Neuroscience of Creativity* (Rex E Jung & Oshin Vartanian eds) (Cambridge University Press, 2018) at p 535.

96 Kenneth M Heilman & Ira S Fischler, "Creativity and the Aging Brain" in *The Cambridge Handbook of the Neuroscience of Creativity* (Rex E Jung & Oshin Vartanian eds) (Cambridge University Press, 2018) at pp 488–489.

97 Stephanie J Kane *et al*, "Attention, Affect, and Creativity, From Mindfulness to Mind-Wandering" in *The Cambridge Handbook of Creativity and Emotions* (Zorana Ivcevic, Jessica D Hoffmann & James C Kaufman eds) (Cambridge University Press, 2023) at p 130.

98 Aaron Kozbelt, "Evolutionary Approaches to Creativity" in *The Cambridge Handbook of Creativity* (James C Kaufman & Robert J Sternberg eds) (Cambridge University Press, 2nd Ed, 2019) at p 109; Thomas B Ward & Yuliya Kolomyts, "Creative Cognition" in *The Cambridge Handbook of Creativity* (James C Kaufman & Robert J Sternberg eds) (Cambridge University Press, 2nd Ed, 2019) at p 175.

99 Izabela Lebuda *et al*, "Interpersonal Relationships, Social Emotions, and Creativity" in *The Cambridge Handbook of Creativity and Emotions* (Zorana Ivcevic, Jessica D Hoffmann & James C Kaufman eds) (Cambridge University Press, 2023) at p 299.

44 Of course, some scholars within creativity study challenge this anthropocentric focus. For example, Moruzzi suggests creativity's key elements are "problem-solving, evaluation, and naivety", which represents a less anthropocentric framework against which to consider creativity from both "natural and artificial" sources.[100] Arriagada argues that computer-generated art meets "novelty, surprise and aesthetic value" criteria and that such art is criticised due to an anthropocentric bias.[101] And experiments by Millet *et al* suggest that people "systematic[ally] depreciate … AI-made art to serve a shaken anthropocentric worldview whereby creativity is exclusively reserved for humans", in the context of advancements in AI technology that blur the lines between AI and human creative output.[102]

45 Despite these protestations, the general thrust of creativity research to this point has been anthropocentric. The question then is whether AI, in process and output, is similar enough to human creativity to be situated within that framework – or whether creativity remains the preserve of the human brain.

V. Is artificial intelligence "creative"?

46 In the previous two parts, this article has identified how creativity scholars have long struggled to define the term, and how they have anthropocentrically focused on creativity. This uncertain landscape means it is certainly possible for AI to be situated within the field of creativity as defined by creativity scholars, as long as the main question – Is AI creative? – can be answered affirmatively. Using a composite definition (creativity is the "ability to produce novel … useful … [surprising and adequate] ideas") and drawing on the various strands of creativity research surveyed in Parts III and IV, this section answers that question by looking at AI's inability to fully replicate human creativity, and AI's ability to produce novel, useful and adequate outputs.

A. Artificial intelligence cannot fully replicate human creativity

47 Creativity scholarship typically presupposes that creativity is the outcome of human neural processes. The question then is whether AI's

100 Caterina Moruzzi, "Measuring Creativity: An Account of Natural and Artificial Creativity" (2021) 11 *European Journal for Philosophy of Science* 1 at 17.

101 Leonardo Arriagada, "CG-Art: Demystifying the Anthropocentric Bias of Artistic Creativity" (2020) 32(4) *Connection Science* 398 at 404.

102 Kobe Millet *et al*, "Defending Humankind: Anthropocentric Bias in the Appreciation of AI Art" (2023) 143 *Computers in Human Behavior* 107707 at p 8.

processes mirror those human neural processes enough to fold them into creativity research's understanding of those processes.

48 On the one hand, computational creativity scholars (a subfield of computer science) would strongly argue in the affirmative. This subfield asks very similar questions of how machines create (*eg*, "What does it mean to be 'creative'? … How does creativity relate to expertise and to what extent does it necessitate specialized domain knowledge?").[103] In computational creativity the focus is not as much on the scope of creativity as a definition, but on the nature of the outputs and the process: "identify[ing] an archetypal area of creative endeavor and attempt[ing] to model that area computationally".[104] The goal of the field is to show that machines do not just mimic what they have been taught by their human creators (typically programmers), but that they "are capable of true, human-level creativity".[105]

49 Because computational creativity scholarship eschews the need for precise definitions of creativity, it can adopt a "know-it-when-you-see-it" approach, and can ground its claims both in the process of generating outputs and the objective assessment of the outputs themselves.[106] Thus, computational creativity scholars argue that machines *can* meet commonly-accepted thresholds for creativity like novelty and value.[107]

50 There are, however, good reasons to be sceptical of these arguments in relation to AI, especially when viewed through the lens of creativity research.[108] First, AI relies on preselected input data, which is

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103 Tony Veale, F Amílcar Cardoso & Rafael Pérez y Pérez, "Systematizing Creativity: A Computational View" in *Computational Creativity: The Philosophy and Engineering of Autonomously Creative Systems* (Springer, 2019) at p 3.

104 Tony Veale, F Amílcar Cardoso & Rafael Pérez y Pérez, "Systematizing Creativity: A Computational View" in *Computational Creativity: The Philosophy and Engineering of Autonomously Creative Systems* (Springer, 2019) at p 2.

105 Tony Veale, F Amílcar Cardoso & Rafael Pérez y Pérez, "Systematizing Creativity: A Computational View" in *Computational Creativity: The Philosophy and Engineering of Autonomously Creative Systems* (Springer, 2019) at p 4.

106 See Oliver Brown, *Beyond the Creative Species: Making Machines That Make Art and Music* (MIT Press, 2021) at p 46.

107 There is also mathematical theory of the deep learning processes that occurs in generative AI models, though a detailed treatment of this theory is beyond the scope of this article as it explains the process of deep learning rather than making a normative argument that such models can be considered creative. For a recent treatment of deep learning mathematical theory, see Philipp Petersen & Jakob Zech, *Mathematical Theory of Deep Learning* (October 2024) <https://arxiv.org/pdf/2407.18384> (accessed 24 September 2025).

108 See the response to AI "creativity' in a 2023 manifesto of leading creativity scholars: Florent Vinchon *et al*, "Artificial Intelligence & Creativity: A Manifesto for

(cont'd on the next page)

considerably narrower than the "databases" humans draw on to create: "a combination of real-world experience, emotion, and inspiration".[109] Artificial intelligence databases "are vast but conventionally structured", whereas the "databases" humans draw from are influenced by their experiences and many years "searching, practising, elaborating, testing, and refining their points of view, styles, mediums, etc".[110]

51 Further, even though machine learning is multifaceted, drawing on data in an information bank – like AI does – is fundamentally different from "active involvement by [the person] … and the construction of original and useful meaning".[111] AI is inherently derivative, rather than "authentic", in its creative processes: [112]

> AI output depends entirely on the data it discovers somewhere in various data bases. The output is either identical to what it finds (and already exists) or, more likely, is *derivative* of what already exists. This constrains or even may preclude originality. [emphasis added]

52 This derivative nature extends to a lack of "intentionality": namely what begins the process of creativity. Runco argues that AI may even identify "original problems, but …would need to be programmed to do so [while] … [h]umans can find, define, and redefine problems in a creative fashion … [and] often initiate this process for themselves".[113] To that end, Root-Bernstein's argument is persuasive: AI operates on the basis that cognition can be "reduced to algorithmic methods", but AI has not yet reduced "sensations, emotions, perception, body thinking, analogizing and other tools … to symbolic algorithms" – meaning that "AI programs emulate but do not create".[114] They are derivative, not inventive, in nature.

53 This derivative nature leads to the second argument against labelling AI creative: that it is typically geared towards the median,

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Collaboration" (2023) 57(4) *The Journal of Creative Behavior* 472.

109 Keith Kirkpatrick, "Can AI Demonstrate Creativity?" (2023) 66(2) *Communications of the ACM* 21 at 22.

110 Florent Vinchon *et al*, "Artificial Intelligence & Creativity: A Manifesto for Collaboration" (2023) 57(4) *The Journal of Creative Behavior* 472 at 474.

111 Mark A Runco, "The Authentic Learning of Humans is a Creative Process and Very Different From the Artificially Creative Output of AI" (2025) 59(3) *The Journal of Creative Behavior* e1520 at p 2.

112 Mark A Runco, "Updating the Standard Definition of Creativity to Account for the Artificial Creativity of AI" (2025) 37(1) *Creativity Research Journal* 1 at 2.

113 Mark A Runco, "Updating the Standard Definition of Creativity to Account for the Artificial Creativity of AI" (2025) 37(1) *Creativity Research Journal* 1 at 2.

114 Robert Root-Bernstein, "An Art-Science Perspective on Artificial Intelligence Creativity: From Problem Finding to Materiality and Embodied Cognition" (2025) 35 *Journal of Creativity* 100097 at pp 8–9.

or "safe" option for its output, as opposed to the unpredictability of the human creative processes (which has been noted to be a desirable trait linked to technological development[115]). As Brandt writes, human creativity involves the option of "bypass[ing] the most likely outcomes and gambl[ing] … on lower odds of success", as with composers like Beethoven.[116] Yet large language models underlying products like ChatGPT are inherently limited to "steer themselves towards the most *likely* outcomes … cut[ting it] off from a vital resource of human ingenuity".[117] Artificial systems are unlikely to be able to pursue "radical novelty", which are entirely new forms of creative outputs rather than variations of existing outputs.[118]

54 At best, large language models could *potentially* replicate combinatorial or exploratory creativity ("making unfamiliar combinations of familiar ideas … finding new, unexplored solutions inside the current style of thinking"), but would be much less likely to produce transformational creativity (which is "related to changing the current style of thinking") because they are set up to work within the patterns of data they are trained on.[119] As Frosio argues, there is a fundamental difference between the neuroscientifically-identified observation of human creativity ("reworking the conceptual idea into a new expression"), and the "recall"-based methods by which AI, and other machines, "derive their creativity from the actual objects – or data – previously processed via their [machine learning]".[120]

115 Gaétan de Rassenfosse, Adam B Jaffe & Joel Waldfogel, "Intellectual Property and Creative Machines" (2025) 4 *Entrepreneurship and Innovation Policy and the Economy* 47 at 64, citing Feng Shi & James Evans, "Surprising Combinations of Research Contents and Contexts Are Related to Impact and Emerge With Scientific Outsiders From Distant Disciplines" (2023) 14(1) *Nature Communications* 1641.

116 Anthony K Brandt, "Beethoven's Ninth and AI's Tenth: A Comparison of Human and Computational Creativity" (2023) 33 *Journal of Creativity* 1000068 at p 5.

117 Anthony K Brandt, "Beethoven's Ninth and AI's Tenth: A Comparison of Human and Computational Creativity" (2023) 33 *Journal of Creativity* 1000068 at p 5.

118 David H Cropley, Kelsey E Medeiros & Adam Damadzic, "The Intersection of Human and Artificial Creativity" in *Creative Provocations: Speculations on the Future of Creativity, Technology & Learning* (Danah Henriksen & Punya Mishra eds) (Springer, 2022) at p 24.

119 Giorgio Franceschelli & Mirco Musolesi, "On the Creativity of Large Language Models" (2025) 40 *AI & Society* 3785; see also Patrick Krauss, *Artificial Intelligence and Brain Research: Neural Networks, Deep Learning and the Future of Cognition* (Springer Berlin, 2024) at p 145.

120 Giancarlo Frosio, "The Artificial Creatives: The Rise of Combinatorial Creativity From DALL-E to ChatGPT" in *Handbook of Artificial Intelligence at Work: Interconnections and Policy Implications* (Martha Garcia-Murillo, Ian MacInnes & Andrea Renda eds) (Edward Elgar Publishing, 2024) at p 239.

55 Derivative creativity is not just limited relative to human creativity, but can have unwanted effects on innovation if not managed. As Cropley and Cropley argue:[121]

> … the problem is that AI produces only a 'mirage' of creativity. It drives creativity and innovation down an exclusively incremental pathway. Its very nature, and its training mean that it is incapable of escaping the Diminishing Returns curve, and actually risks driving innovation beyond the point of diminishing returns into a region of *negative* returns: increasingly costly and inefficient solutions to old problems. [emphasis in original]

56 The paradox is that the more AI is trained to replicate a particular form of art, the less likely it is to produce the radical novelty that defines it, despite some tentative indications that other methods *could* produce radical novelty in the future.[122] To that end it is unsurprising that a Tenth Symphony, following Beethoven's Ninth, generated by AI, "did not grasp crucial features of [Beethoven's] … creative process", despite extensive input data.[123] Circularity, standardisation, and homogenisation are therefore much likelier products of AI processes than the radical shifts "[into] new directions or genres" that characterise human creative effort.[124]

57 It is certainly possible to *conceptualise* AI as another type of brain, which mimics how scientists have observed the brain to operate creatively,[125] even though that technology is not widely available. Further, some GAI models have features that *can* be manipulated to mimic statistically unlikely responses, like the temperature parameter, which "determines how varied the responses by generative AI will be": the lower the temperature, the more predictable the responses, while the higher the temperature, the more outrageous or unpredictable the responses.[126]

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121 David Cropley & Arthur Cropley, "Creativity and the Cyber Shock: The Ultimate Paradox" (2023) 57(4) *The Journal of Creative Behavior* 485 at 486.

122 David H Cropley, Kelsey E Medeiros & Adam Damadzic, "The Intersection of Human and Artificial Creativity" in *Creative Provocations: Speculations on the Future of Creativity, Technology & Learning* (Danah Henriksen & Punya Mishra eds) (Springer, 2022) at p 27.

123 Anthony K Brandt, "Beethoven's Ninth and AI's Tenth: A Comparison of Human and Computational Creativity" (2023) 33 *Journal of Creativity* 1000068 at p 7.

124 Guido Westkamp, "Borrowed Plumes: Taking Artists' Interests Seriously in Artificial Intelligence Regulation" (30 May 2024) <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4799179> (accessed 24 September 2025).

125 See, *eg*, Luis De Garrido, "Conceptual Design of a Creative Artificial Intelligence System Based on the Neurocognitive Bases of Human Creativity in the Brain" (2022) 34(3) *Creativity Research Journal* 273.

126 Lance B Eliot, "Knowing About Temperature Settings When Using Generative AI Is Hot Stuff for Prompt Engineering", *Forbes* (29 July 2024) <https://www.forbes.com/sites/lanceeliot/2024/07/29/knowing-about-temperature-settings-when-using-generative-ai-is-hot-stuff-for-prompt-engineering/> (accessed 24 September 2025).

58 However, the temperature parameter arguably does not properly reflect the human ability to produce a surprising or radical outcome. This is because the likelihood of AI hallucinating increases as the temperature increases.[127] Artificial intelligence hallucinations are outputs that may *sound* accurate but are fictitious and/or incoherent.[128] Despite the greater likelihood of a more surprising, radical (and therefore "creative") output with a higher temperature, the hallucination risks highlight an important difference between an AI and human processes: a person arriving at a surprising, radical or unique idea will generally be aware of the need for, and can demonstrate a degree of, coherence and adherence to objective reality. An AI model, on the other hand, *may* present what sounds "creative", but with much less, and possibly no regard for coherence or reality.[129] The fact that these types of "errors" are still regular features of even the most advanced AI models suggests a structural indifference to coherence and objective reality[130] that will not be remedied without paradigmatic technology shifts.[131] As Hacker *et al* write, "[T]he potential [of GAI] is indeed substantial … [but] the current reality does not (yet) match some of the more breathless rhetoric."[132]

59 For these reasons, the anthropocentric emphasis of creativity research appears justified. There remains a fundamental difference

127 Lance B Eliot, "Knowing About Temperature Settings When Using Generative AI Is Hot Stuff for Prompt Engineering", *Forbes* (29 July 2024) <https://www.forbes.com/sites/lanceeliot/2024/07/29/knowing-about-temperature-settings-when-using-generative-ai-is-hot-stuff-for-prompt-engineering/> (accessed 24 September 2025).

128 Lance B Eliot, "Knowing About Temperature Settings When Using Generative AI Is Hot Stuff for Prompt Engineering", *Forbes* (29 July 2024) <https://www.forbes.com/sites/lanceeliot/2024/07/29/knowing-about-temperature-settings-when-using-generative-ai-is-hot-stuff-for-prompt-engineering/> (accessed 24 September 2025); Lance Eliot, "AI Hallucinations Said to Be Proven As Unavoidably Inevitable but Don't Unduly Despair Since They Are Hopefully Detectable and Likely Correctable", *Forbes* (29 February 2024) <https://www.forbes.com/sites/lanceeliot/2024/02/29/ai-hallucinations-said-to-be-proven-as-unavoidably-inevitable-but-dont-unduly-despair-since-they-are-hopefully-detectable-and-likely-correctable/>(accessed 24 September 2025).

129 See, *eg*, Matthew Weaver, "AI Chatbots Distort and Mislead When Asked About Current Affairs, BBC Finds", *The Guardian* (11 February 2025) <https://www.theguardian.com/technology/2025/feb/11/ai-chatbots-distort-and-mislead-when-asked-about-current-affairs-bbc-finds> (accessed 24 September 2025).

130 Patrick Krauss, *Artificial Intelligence and Brain Research: Neural Networks, Deep Learning and the Future of Cognition* (Springer Berlin, 2024) at p 154.

131 *Cf* Harry Surden, "ChatGPT, Large Language Models, and Law" (2024) 92 *Fordham Law Review* 1941, at 1966–1967.

132 Philipp Hacker *et al*, "Introduction to the Foundations and Regulation of Generative AI" in *Oxford Handbook of the Foundations and Regulation of Generative AI* (Oxford University Press, 2024) (forthcoming) <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=5137750> (accessed 24 September 2025).

between AI and human neural processes: AI "present[s] an imitation of certain cognitive functions *rather than a true replication of human intelligence*" [emphasis added].[133] AI software, without "conscious appreciation of reality and of imagined futures", will only ever be able to replicate "part of the creative process".[134] Further, the propensity for the "safe" option means it cannot consistently be said to produce "surprising" results (that consistently retain coherence and a connection to objective reality). Thus, AI cannot be regarded as fully creative.

B. Artificial intelligence is more than a tool

60 On the other hand, AI is more than a mere tool, particularly when we consider the other elements of the creativity definition adopted above (novelty, use and adequacy). Most of the metrics developed in the creativity literature to test creativity has been of the human brain (psychometrics) and human behaviour (neuroscience). Similar metrics are being used to test the responses of both AI and humans, to offer comparative insights into the creativity of both. These metrics suggest AI is more than a mere tool.

61 In one study, Grassini and Koivisto used the Figural Interpretation Quest ("a perceptually based multimodal task that involves not only text processing, but also visual inputs … [which] challenges the participants to provide creative interpretations for ambiguous, abstract figures") to compare a set of human respondents and ChatGPT (using GPT-4).[135] They noted that if creativity is assessed based on *outcomes* rather than *internal processes*, then "AI's capability to generate creative outputs … has matched or even surpassed the average human level in certain types of tasks".[136] More specifically Grassini and Koivisto noted AI "excel[led] in associative aspects of divergent thinking [which involves] generating semantically diverse ideas", due to advantages like "expansive memory and rapid access to extensive text databases".[137]

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133 Konstantinos Sgantzos *et al*, "Minds and Machines: Evaluating the Feasibility of Constructing an Advanced Artificial Intelligence" (2024) 4 *Discover Artificial Intelligence* 104 at p 3.

134 Florent Vinchon *et al*, "Artificial Intelligence & Creativity: A Manifesto for Collaboration" (2023) 57(4) *The Journal of Creative Behavior* 472 at 475.

135 Simone Grassini & Mika Koivisto, "Artificial Creativity? Evaluating AI Against Human Performance in Creative Interpretation of Visual Stimuli" (2025) 41(7) *International Journal of Human-Computer Interaction* 4037 at 4038 and 4040.

136 Simone Grassini & Mika Koivisto, "Artificial Creativity? Evaluating AI Against Human Performance in Creative Interpretation of Visual Stimuli" (2025) 41(7) *International Journal of Human-Computer Interaction* 4037 at 4044.

137 Simone Grassini & Mika Koivisto, "Artificial Creativity? Evaluating AI Against Human Performance in Creative Interpretation of Visual Stimuli" (2025) 41(7) *International Journal of Human-Computer Interaction* 4037 at 4044.

62 In another study, Guzik, Byrge and Gilde examined how ChatGPT performed on the Torrance Tests of Creative Thinking: "a suite of authentic activities that prompt the test-taker to engage in various types of thinking that mirror the kinds of creativity required for real-life and daily human operations, including asking questions, guessing causes and consequences, improving a product, and utilizing imagination".[138] They found GPT-4 performed favourably, demonstrating an "ability … to generate novel and unexpected ideas", which they suggest is the first indication in the research that "AI matches or exceeds human abilities for original thinking":[139]

> [N]ot only are the latest forms of AI generating large numbers of ideas (fluency) and different types, variations, and categories of ideas (flexibility), they are, for the first time, generating new, unique, and unexpected ideas (originality), performing in the top percentile for original thinking. In short, AI models like GPT-4 are becoming capable of producing ideas that humans consider to be original, novel, and unique.

63 Last, Orwig *et al* compared the creativity of 600 short stories generated by humans and GPT models, finding that GPT-3 and GPT-4 "can generate stories that are comparable in creativity to those produced by humans".[140]

64 Thus, assuming creativity has an *external* component based on factors like novelty, use, and adequacy, AI can certainly produce outputs that meet those elements, and this can be verified by comparing its performance against human creators using traditional creativity tests.[141] Doing so supplements existing anecdotal evidence that suggests AI creations are indistinguishable from human creations in terms of quality.[142]

65 Nevertheless, even such comparative studies using established creativity metrics may suggest AI still falls short of human creativity. For example, Grassini and Koivisto found that at present, AI does not possess the breadth of human creative capacity: "[W]hile AI can generate

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138 Erik E Guzik, Christian Byrge & Christian Gilde, "The Originality of Machines: AI Takes the Torrance Test" (2023) 33(3) *Journal of Creativity* 100065 at p 2.

139 Erik E Guzik, Christian Byrge & Christian Gilde, "The Originality of Machines: AI Takes the Torrance Test" (2023) 33(3) *Journal of Creativity* 100065 at p 4.

140 William Orwig *et al*, "The Language of Creativity: Evidence From Humans and Large Language Models" (2024) 58(1) *The Journal of Creative Behavior* 128 at 134.

141 See further Jennifer Haase & Paul HP Hanel, "Artificial Muses: Generative Artificial Intelligence Chatabots Have Risen to Human-level Creativity" (2023) 33 *Journal of Creativity* 100066.

142 Gaétan de Rassenfosse, Adam B Jaffe & Joel Waldfogel, "Intellectual Property and Creative Machines" (2025) 4 *Entrepreneurship and Innovation Policy and the Economy* 47 at 64.

creative outputs that are remarkable on average, it has not yet reached the highest level of human creativity."[143] Human responses exhibited greater variation than the GPT-4 responses, which the authors suggest "can be rooted in the very nature of human creativity itself and in the way it may have evolved".[144] The narrower range of responses is a byproduct of AI's pursuit of "statistically optimal responses".[145]

66 Similarly, Guzik, Byrge and Gilde found GPT-4 "scored lower on flexibility on certain activities of the [Torrance tests]".[146] And in a study comparing how the AI image generator DALL-E undertook "combinational creativity" ("unfamiliar combinations of familiar ideas"), Chen, Sun and Han found that while "DALL-E's performance is very close to novice designers … human designers are better at synthesizing features from the base and the additive for a combinational design".[147] And Gilhooly's review of studies involving AI undertaking the Alternative Uses Task ("a prototypical verbal divergent task in which the goal is to generate as many uses as possible, different from the normal use, for familiar objects, within a fixed time") suggest that while GPT-based systems (like ChatGPT) may produce "novel and useful ideas", they cannot be considered fully "creative" because they lack intention and agency.[148]

67 Thus, the application of traditional creativity metrics to AI suggests AI can produce outputs that mirror human creativity in some aspects, though in relation to others, human creativity outperforms it.

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143 Simone Grassini & Mika Koivisto, "Artificial Creativity? Evaluating AI Against Human Performance in Creative Interpretation of Visual Stimuli" (2025) 41(7) *International Journal of Human-Computer Interaction* 4037 at 4044.

144 Simone Grassini & Mika Koivisto, "Artificial Creativity? Evaluating AI Against Human Performance in Creative Interpretation of Visual Stimuli" (2025) 41(7) *International Journal of Human-Computer Interaction* 4037 at 4044.

145 Simone Grassini & Mika Koivisto, "Artificial Creativity? Evaluating AI Against Human Performance in Creative Interpretation of Visual Stimuli" (2025) 41(7) *International Journal of Human-Computer Interaction* 4037 at 4045.

146 Erik E Guzik, Christian Byrge & Christian Gilde, "The Originality of Machines: AI Takes the Torrance Test" (2023) 33(3) *Journal of Creativity* 100065 at p 5.

147 Liuqing Chen, Lingyun Sun & Ji Han, "A Comparison Study of Human and Machine-Generated Creativity" (2023) 23 *Journal of Computing and Information Science in Engineering* 051012 at p 9.

148 Ken Gilhooly, "AI Vs Humans in the AUT: Simulations to LLMs" (2024) 34 *Journal of Creativity* 1000071 at pp 1 and 5. It appears that even with the launch of GPT-5, similar issues remain, suggesting that the difference between AI and human creativity is more structural than developmental. See, *eg*, Anthony K Brandt, '"Amplifying the Anomaly: How Humans Choose Unproven Models and Large Language Models Avoid Them" (2025) 37(4) *Creativity Research Journal* 582.

C. Is artificial intelligence creative?

68 This article is centred on the following question: Is AI creative? Creativity research reveals a nuanced, non-binary response: AI is not fully creative, yet it is more than a tool.[149] There are strong arguments to suggest that the "surprise" element remains something the human mind currently holds sole preserve over, given AI's propensity to produce expected, rather than unexpected or surprising outcomes. In that sense the anthropocentric emphasis of creativity research remains intact: it is not fully accurate to situate AI under the nomenclature of "creativity".

69 Nevertheless, scholarship from computational creativity and creativity research suggests that, at the very least, AI can in some cases produce novel, useful and adequate ideas compared with human actors. It has capacities far exceeding conventional output-producing tools like graphic design software and physical creative instruments. It has the proven capability to generate outputs closely mirroring human-created work under established creativity metrics (novelty, usefulness, adequacy).

70 It is thus accurate to say that AI cannot be considered *fully* creative, though its capabilities suggest it is more than a simple tool. This more nuanced finding has unique implications for the protection of AI-generated works under copyright law, which this article explores in Part VI.

VI. Artificial intelligence is not *fully* "creative" – what now for AI-generated works under copyright law?

71 The position on AI creativity above suggests there should be a correspondingly nuanced response to the issue of whether/how AI-generated works should be protected under copyright law. We cannot merely treat AI as a tool, because doing so is to recognise the creator has undertaken independent intellectual effort, or expended skill and labour, in creating a work, while in fact the bulk of that labour will often have been undertaken in the "mind" of the AI.[150] Yet if AI is not fully "creative",

149 See further the "middle ground" approach taken in Mirko Farina, Witold Pedrycz & Andrea Lavazza, "Towards a Mixed Human-Machine Creativity" (2024) 8 *Journal of Cultural Cognitive Science* 151.

150 See Tianxiang He, "AI Originality Revisited: Can We Prompt Copyright Over AI-Generated Pictures?" (2024) 73(4) *GRUR International* 299 at 301. Notably, this finding applies in relation to general-purpose large language models like Microsoft Copilot, and advanced AI tools available in software like Adobe Photoshop, because they all typically involve the provision of instructions to an AI that will use learned data to generate outcomes. Of course, cases may exist where there is detailed prompting of the AI model with repeated refining and feedback. In those cases, the

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why should the same level of protection apply to an AI-generated work as to a work generated by a human, who *is*, on the conception outlined above fully creative?

72 This tension is supplemented by another: the tension between the recognition of novelty in creativity research as a hallmark of creativity, and the fact that copyright law does not protect novelty, only originality. Of course, novelty is not the key differentiator between human and AI capabilities; it is generally the ability to produce transformational or surprising outcomes. This differentiation between human and AI creative capacities is consistent with the idea that originality (a precursor for copyright to subsist in literary, dramatic, musical and artistic works) often requires human authorship.[151] This means the analysis of creative capacities above *can* usefully inform the development of copyright laws that balance the protection of human creative labour and technological innovation. One of the many potential avenues for doing so is to repurpose "computer-generated works" provisions that exist in certain domestic copyright laws to allow copyright protection to apply even where AI undertakes the bulk of the creative "labour".[152]

A. AI-specific computer-generated works provisions

73 The gist of the computer-generated works ("CGW") provision in force in the UK and a selection of other countries is that where works are generated in circumstances where there is no human author, a certain party is designated the "author", typically "the person by whom the arrangements necessary for the creation of the work are undertaken"[153] or some variation of the same.[154] The term of protection for these works is typically 50 or 70 years from the making of the work.[155] In most cases this will be less than the minimum term required for original works

extended intellectual labour applied may make it appropriate to consider AI merely a tool. Yet it is reasonable to begin with the premise that AI is more than a tool, and therefore that the cost-benefit equation of copyright should be revisited to ensure that society is not unduly restricted from accessing and using AI-generated works.

151 See, *eg*, *Telstra Corporation Limited v Phone Directories Company Pty Ltd* [2010] FCAFC 149 at [72].

152 See, *eg*, Söğüt Atilla, "Dealing with AI-generated Works: Lessons From the CDPA Section 9(3)" (2024) 19(1) *Journal of Intellectual Property Law & Practice* 43.

153 Copyright, Designs and Patents Act 1988 (c 48) (UK) s 9(3); Copyright Act 1994 (NZ) s 5(2)(a); Copyright and Related Rights Act 2000 (Ireland) s 21(*f*); Copyright Ordinance Cap 528 (Hong Kong) s 11(3).

154 See, *eg*, Copyright Act 1957 (India) s 2(d)(vi): "the person who causes the work to be created".

155 Copyright Act 1994 (NZ) s 22(2); Copyright, Designs and Patents Act 1988 (c 48) (UK) s 12(7); Copyright and Related Rights Act 2000 (Ireland) s 30; Copyright Act 98 of 1978 (South Africa) s 1(1).

generally (50 years after the author's death, and in many cases 70 years after the author's death). The UK Government is currently considering removing its CGW provision,[156] a move likely to influence other common law countries that have closely followed the wording of such provisions (New Zealand, Ireland, India, Hong Kong and South Africa).

B. Duration of protection

74 The duration of protection for these works is more commensurate with the typically lopsided balance between AI's creative capacities and the role of a prompter/instructor (50 years *versus* 70 years after the author's death). As indicated above, copyright is an imposition of costs (restricting public use of creative works) justified by the benefits of incentivising creative labour; but with the paradigmatic shift to creative labour AI has brought, there is arguably no need for the costs of the extensive life-plus copyright terms presently given to creators of original works. The duration for computer-generated works provisions better reflects the reduced role of human creators, while still acknowledging the need for some protection to fulfil copyright's incentive and reward goals in respect of those works.[157] This middle ground is more desirable than the all-or-nothing binary proposed by Goold:[158]

> … UK law would be on firmer footing if, like most other jurisdictions, computer-generated works were subject to the traditional rules of copyright (i.e. they can be protected by copyright (for life plus 70 years including economic and moral rights) if they are the original creative work of an author; *if they do not pass that threshold, then they would be better off in being dedicated to the public domain*. [emphasis added]

75 However, it is not suggested that a 50-year term for AI-generated works is ideal. The 50-year minimum is imposed by the Agreement on Trade-Related Aspects of International Property Rights[159] ("TRIPS"). However, a term for computer-generated works more in line with copyright protection afforded to industrially-applied works in New Zealand (16 years for sculptures and artistic works; 25 years for works of artistic craftsmanship) would even more appropriately reflect the

156 UK Intellectual Property Office, *Copyright and Artificial Intelligence: Consultation* (CP 1205, December 2024) at Section D.1.

157 See, *eg*, Neville Cordell, Beverley Potts & Robert Dickens, "Ownership of AI-Generated Content in the UK" (2024) 46(7) *European Intellectual Property Review* 470 at 478.

158 Patrick Goold, "The Curious Case of Computer-generated Works Under the Copyright, Designs and Patents Act 1988" (2021) 2 *Intellectual Property Quarterly* 120 at 130.

159 (15 April 1994), 1869 UNTS 299, Art 12 (entered into force 1 January 1995).

outsized creative capacity AI has, which is only likely to increase as technology advances.[160]

76 The industrial designs rule in New Zealand is permitted under the Berne Convention ("Berne") – the treaty ratified by most countries around the world harmonising minimum protections under domestic copyright law – as an exception to Berne's general requirement for at least 50 years following an author's death.[161] It is also likely covered as a permitted exception to a similar rule in TRIPS (works of applied art).[162]

77 Should TRIPS ever be amended to include an exception to the minimum term for computer-generated works, an analysis similar to that used to determine the industrial copyright terms in New Zealand or TRIPS (10 years)[163] should be undertaken to reapportion the copyright duration for computer-generated works in the context of AI's creative capacities, reflecting the limited intellectual effort *generally* expended by prompt-generators (or equivalent instruction-providers) and the fact that AI does the bulk of the "creative" labour.[164]

78 However, given the unlikely nature of amendments to ratified international treaties like TRIPS and Berne, it is more realistic to pursue law reform within the bounds of those treaties.[165] The computer-generated works provision, if applied to AI-generated works, represents a path forward that better reflects AI's "more than a tool" capacities while still incentivising and rewarding the human effort necessary to utilise those capacities. Countries without those provisions, particularly in common law legal systems similar to the UK like Singapore and Australia, should consider implementing them, and countries like the UK should think very carefully about removing them given the likely, and rapid, advancement of AI technologies.

160 Copyright Act 1994 (NZ) s 77(1).

161 Berne Convention for the Protection of Literary and Artistic Works (9 September 1886), 828 UNTS 221, Arts 2(7) and 7(1) (entered into force 29 January 1970).

162 Agreement on Trade-Related Aspects of Intellectual Property Rights (15 April 1994), 1869 UNTS 299, Art 12 (entered into force 1 January 1995) (works of applied art and photographs are exempt).

163 Agreement on Trade-Related Aspects of Intellectual Property Rights (15 April 1994), 1869 UNTS 299, Art 26(3) (entered into force 1 January 1995).

164 Policymakers could consider adding carve-outs where authors can demonstrate they have expended a reasonable amount of intellectual effort so as to be granted the usual duration of protection afforded to works under copyright law. The administration of such provisions, however, may mean they are not feasible.

165 See, *eg*, Rebecca Giblin, "A New Copyright Bargain? Reclaiming Lost Culture and Getting Authors Paid" (2018) 41(3) *The Columbia Journal of Law & the Arts* 369.

C. Authorship and originality

79 An amended computer-generated works provision directed at GAI-produced works requires some clarification. There has been very little case law on the computer-generated works provision,[166] and none dealing with AI-generated works. Thus it is not clear who exactly the "author" is in the context of AI systems.[167] The UK government indicates that in a prompt-based AI system "the 'author' [the person by whom the arrangements necessary for the creation of the work are undertaken] will usually be the person who inputted the prompt".[168] However, some argue it is the developer.[169] An update to the computer-generated works provision to cover AI-generated works will need to specify who the author is in the case of a prompt or instruction-based GAI model, and that it is *not* the developer, given there is little justification for granting copyright in a work that is produced *via* specific instructions from one person to the company or person who created the model itself.[170]

80 While the UK Government suggests there is an apparent contradiction between the requirement for copyright-protected works to have originality (regarded as a human-only trait) and the definition of a computer-generated work as one where there is no human author,[171] others suggest the computer-generated work provision is "an exception to the creativity and originality requirements for the subsistence of copyright".[172] The tension remains unresolved.[173]

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166 *Nova Productions Ltd v Mazooma Games Ltd* [2006] EWHC 24 (Ch).

167 Nicola Lucchi, "ChatGPT: A Case Study on Copyright Challenges for Generative Artificial Intelligence Systems" (2024) 15 *European Journal of Risk Regulation* 602 at 609.

168 UK Intellectual Property Office, *Copyright and Artificial Intelligence: Consultation* (CP 1205, December 2024) at para 131.

169 See, *eg*, Jyh-An Lee, "Computer-generated Works Under the CDPA 1988" in *Artificial Intelligence and Intellectual Property* (Jyh-An Lee, Reto Hilty & Kung-Chung Liu eds) (Oxford University Press, 2021) at p 189.

170 See further Julia Dickenson, Alex Morgan & Birgit Clark, "Creative Machines: Ownership of Copyright in Content Created By Artificial Intelligence Applications" (2017) 39(8) *European Intellectual Property Review* 457 at 459; Benjamin Williams, "Painting by Numbers: Copyright Protection and AI-generated Art" (2021) 43(12) *European Intellectual Property Review* 786 at 791–792.

171 UK Intellectual Property Office, *Copyright and Artificial Intelligence: Consultation* (CP 1205, December 2024) at para 135; see also Patrick Goold, "The Curious Case of Computer-Generated Works Under the Copyright, Designs and Patents Act 1988" (2021) 2 *Intellectual Property Quarterly* 120 at 123–126.

172 Andres Guadamuz, "Do Androids Dream of Electric Copyright? Comparative Analysis of Originality in Artificial Intelligence Generated Works" in *Artificial Intelligence and Intellectual Property* (Jyh-An Lee, Reto Hilty & Kung-Chung Liu eds) (Oxford University Press, 2021) at p 159.

173 Oways A Kinsara, "Clash of Dilemmas: How Should UK Copyright Law Approach the Advent of Autonomous AI Creations?" (2021) 6(2) *Cambridge Law Review* 62

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81 The phrase "in circumstances where there is no human author" in the definition of "computer-generated"[174] is problematic given it raises the originality issue despite its paradoxical reliance on human effort, namely the person who made "the arrangements necessary for the creation of the work". This would suggest that the arrangements necessary for the creation of the work do *not* meet the threshold for originality and authorship, which is often not the case for a prompter – many prompts, even if simple, will meet the minimal threshold for originality. Accordingly, there is a strong argument for removing that phrase to avoid confusion in the GAI context, and specifying that the author is the person who provides the instructions necessary for the creation of a specific work (which would in most cases be the user, or prompter).

82 Given this clarification, originality would still come into consideration in determining whether copyright protection should be granted because the Copyright, Designs and Patents Act 1988[175] ("CDPA") only protects original literary, dramatic, musical or artistic works.[176] In the UK, originality requires that the work is "the author's own intellectual creation", such that "the author was able to express their creative abilities in the production of the work by making free and creative choices so as to stamp the work created with their personal touch".[177]

83 It would be consistent for the assessment of originality of GAI-produced works to be restricted to the instructions provided, because that is the extent of the author's input.[178] It is conceivable that courts, in seeking to give effect to the Act's copyright goals, would interpret the originality requirement in the GAI context as requiring something more than the barest of instructions. It is difficult to imagine, for example, that the prompt "generate a picture of a black cat" would by itself justify giving copyright in the resulting image to the prompter and their estate for 50 years after their lifetime. Doing so on a large scale could well "disrupt the balance between copyright and public interest" if, *eg*, AI was used to pre-emptively generate every possible combination of a colour or chord progression to avoid copyright claims.[179] However,

at 76–77.

174 Copyright, Designs and Patents Act 1988 (c 48) (UK) s 178.

175 (c 48) (UK).

176 Copyright, Designs and Patents Act 1988 (c 48) (UK) s 1(1).

177 *THJ Systems Ltd v Sheridan* [2023] EWCA Civ 1354 at [15]–[16].

178 See, *eg*, Julia Dickenson, Alex Morgan & Birgit Clark, "Creative Machines: Ownership of Copyright in Content Created By Artificial Intelligence Applications" (2017) 39(8) *European Intellectual Property Review* 457 at 458: "One way to approach this is to consider whether the deemed author … uses his/her skill, labour and judgment in that arrangement …".

179 Tianxiang He, "AI Originality Revisited: Can We Prompt Copyright Over AI-Generated Pictures?" (2024) 73(4) *GRUR International* 299 at 305.

the breadth of potential creative outputs and instructions means it is unrealistic for parliaments to provide further clarification in statute, and that it is best left to the courts to apply.

84 With all this said, the CGW provision can be amended to more directly address AI works while addressing authorship and originality. Below, a sample provision derived from ss 9(3) and 178 of the CDPA is set out. This proposal has most immediate relevance for the few jurisdictions with such provisions given how closely their wording has mirrored that of the UK Act. However, it can also be readily integrated into the copyright laws of other countries, particularly common law countries like Singapore and Australia.

> **Section 9(3)** In the case of a literary, dramatic, musical or artistic work which is computer-generated, the author shall be taken to be ~~the person by whom the arrangements necessary for the creation of the work are undertaken~~ *the natural person who provided the relevant instructions for the production of that specific work*.
>
> **Section 9(3A) (new)** *For the avoidance of doubt, the natural person referred to in s 9(3) is not the developer or programmer of any computer program, including but not limited to a large language model, except to the extent that the person provides instructions to the program for the production of a specific literary, dramatic, musical or artistic work.*
>
> **Section 178** "computer-generated", in relation to a work, means that the work is generated by ~~computer in circumstances such that there is no human author of the work;~~ a computer program, in circumstances where a natural person provides instructions to a computer program to generate a specific work.

85 Of course, any such proposal must be appropriately integrated given the particularities of domestic legal systems and markets. Further, the rapid development of AI technologies makes regular reviews into the efficacy of any amended CGW provisions a prudent step.

VII. Conclusion

86 AI-generated works present copyright policymakers with a difficult problem: What protection should they receive under copyright law? A robust theoretical understanding of AI's creative capacity is essential to making balanced policy on this issue. In pursuit of this understanding, this article examined what scholars have typically considered "creative", identifying difficulties in defining creativity and an

anthropocentric focus. Defining creativity as the ability to generate novel, useful, surprising and adequate outputs, this article showed that AI is more than a tool but not fully creative. It is more than a tool in that it shifts the *locus* of creative labour from the human mind, and can in many cases replicate outputs we might conventionally associate with human creative labour. Yet, it is also derivative, and less likely than humans to produce the kinds of surprising, lateral outputs that drive innovation and development.

87 This finding is designed to stimulate further explorations as to how copyright laws can better respond to the rise of AI in a way that balances the protection of human creativity and the impetus of technological innovation. One such way is to adapt computer-generated works provisions to apply to AI-generated works. Broadly, this type of provision reduces the cost of copyright protection of AI-generated works (the time in which the public is prevented from freely reproducing them), reflecting the commensurate reduction in creative labour relative to other types of works (typically the author's life plus 50 years or more). Doing so protects the human creativity that *did* contribute to an AI-generated output (AI not being fully creative), yet reducing that protection appropriately because it involved the use of more than a tool. Of course, existing provisions would require significant amendment to ensure they are effective, for example by clarifying issues of authorship and originality.

88 This policy recommendation is most readily applicable in countries with an existing computer-generated works provision like the UK, New Zealand and South Africa. However, countries like Singapore and Australia should also seriously consider implementing such provisions given the rapid rise of AI technologies and their capabilities. The recommendation should also inspire further discussions about other policy options to respond to AI, including statutory remuneration schemes for authors and *sui generis* protections for AI-generated works.[180] More broadly, future research could involve further developing the creativity framework here in the context of increasingly blurred lines between AI and human "creativity" as AI technology develops. It is hoped that these research pathways, and others driven by the analysis in this article, contribute to copyright laws that effectively balance the need

180 See, *eg*, Giancarlo Frosio, "The Artificial Creatives: The Rise of Combinatorial Creativity From DALL-E to ChatGPT" in *Handbook of Artificial Intelligence at Work: Interconnections and Policy Implications* (Martha Garcia-Murillo, Ian MacInnes & Andrea Renda eds) (Edward Elgar Publishing, 2024) at pp 241–242; Jozefien Vanherpe, "Artificial Intelligence and Intellectual Property Law" in *The Cambridge Handbook of the Law, Ethics and Policy of Artificial Intelligence* (Nathalie A Smuha ed) (Cambridge University Press, 2025) at pp 218–219.

to drive creativity, knowledge, culture and innovation, and the access costs necessary to achieve those goals, in the light of paradigm-shifting technologies.