

AI, AUTHOR, AMANUENSIS

WEE LIANG TAN* AND DAVID TAN**

Abstract

The limitless potential of artificial intelligence (AI) to analyse information, execute complex tasks, create and invent, has yet to be fully comprehended or harnessed. At the same time, the laws regulating the behaviour and output of AI systems are also lagging behind. Much has been written on whether AI-generated works should receive copyright protection with different perspectives on elements of originality, creativity and broader policy considerations. This article compares the approaches in a number of jurisdictions and contends that AI today essentially acts as an amanuensis — an assistant or agent — that carries out the creative plan that has been programmed and assigned to it. In the exceptional circumstances that AI arguably creates a work as a result of independent and autonomous deep learning, recognition of “authorship” must nonetheless be satisfied by the location of a nexus to a human individual; otherwise, such works receive no copyright protection. In conclusion, we propose an evaluative framework that recognises both the centrality of the creativity of the human author in the canons of copyright law and the constantly evolving marvels of modern technology.

I. INTRODUCTION

Today, rapid advancements in artificial intelligence (“AI”) capabilities to create art continue to redefine the human role in the creative process. Most of these works of art generated by computers rely heavily on the underlying algorithm and creative input of the programmers. The computers are akin to paintbrushes or chisels – they are tools used in the creation of the artworks.¹ Jane Ginsburg and Luke Ali Budiardjo referred to the “amanuensis” — who acts as an agent by faithfully carrying out the subordinate task assigned by the principal — as distinct from the author in copyright law, and therefore to whom the attribution of authorship should not be accorded.² The authors will be adopting the term “amanuensis” to distinguish between AI that acts in an

* Visiting Researcher, Centre for Technology, Robotics, Artificial Intelligence & the Law (TRAIL), Faculty of Law, National University of Singapore.

** Professor and Co-Director, Centre for Technology, Robotics, Artificial Intelligence & the Law (TRAIL), Faculty of Law, National University of Singapore; Head (Intellectual Property), E.W. Barker Centre for Law & Business, Faculty of Law, National University of Singapore; Senior Fellow, Melbourne Law School.

¹ Andres Guadamuz, *Artificial Intelligence and copyright*, WIPO MAG., Oct. 2017, at 14.

² Jane C. Ginsburg & Luke Ali Budiardjo, *Authors and Machines*, 34 BERKELEY TECH. L.J. 344, 355, 360 (2018) (“Attribution of authorship effectively follows general rules of agency: ‘the physical acts of the agent are attributed wholly to the author’ under whose control and direction the amanuensis acts.”). *See also*, Elizabeth Adeney, *Authorship and Fixation in Copyright Law: A Comparative Comment*, 35 MELBOURNE U. L. REV. 677, 682 (2011) (“when another person acts as an amanuensis to the author, the author will achieve copyright protection for the words recorded,” and that “[t]he physical acts of the agent or scribe are attributed wholly to the author who has supplied the words to be recorded”).

autonomous capacity and AI that functions as an amanuensis that is influenced and controlled by a principal author.

This article argues that the “core concept” of authorship in copyright law is the “creativity in conceiving the work and controlling its execution.”³ AI learning, no matter how sophisticated and advanced, only simulates and mimics human mental processes, even though it may surpass them. This universal paradigm of human creativity is borne out in many different jurisdictions around the world and is most prominently observed in judgments on authorship and copyright subsistence in compilation works.⁴

In April 2016, advertising executive Bas Kōrsten unveiled *The Next Rembrandt*; a computer-generated 3D painting created by a deep learning algorithm with facial recognition software that spent 18 months examining 346 known paintings by the Dutch painter, using 150 gigabytes of digitally rendered graphics. It was the result of a partnership between several industry leaders like ING, Microsoft and T.U. Delft.⁵ In 2018, Obvious, a Paris-based collective, developed the painting *Portrait of Edmond de Belamy* through Generative Adversarial Networks (GANs), which used a sample set – in this case thousands of portraits – to recognise patterns before creating new pieces with that knowledge. In October that year, revered auction house Christie’s in New York marketed the painting as the first portrait generated by an algorithm to come up for auction, and sold it for US\$432,500, over 40 times its initial estimate.⁶ Although the price paled in comparison to traditional masterpieces like Claude Monet’s *Meules* or Pablo Picasso’s *Le Rêve*,⁷ *Portrait of Edmond de Belamy* was noteworthy for its claimed artist: it was not a person but an algorithm (min G max

³ Jane C. Ginsburg, *The Concept of Authorship in Comparative Copyright Law*, 52 DEPAUL L. REV. 1063, 1067, 1072 (2003).

⁴ See, e.g., *Feist Publications, Inc. v. Rural Telephone Service Co.*, 499 U.S. 340, 345 (1991); *IceTV Pty Ltd v. Nine Network Australia Pty Ltd* (2009) 239 CLR 458, [22], [24]-[26], [33], [95]-[99] (Austl.); *Telstra Corporation Ltd v. Phone Directories Company Pty Ltd* [2010] FCAFC 149, [72], [101], [104], [118]-[119], [130], [134], [137], [179] (Austl.); *Global Yellow Pages Ltd v. Promedia Directories Pty Ltd*, [2017] 2 SLR 185, [24], [28] (Sing.); David Tan, *Copyright in Compilations: Embarking on a Renewed Quest for the Human Author and the Creative Spark*, 18 MEDIA & ARTS L. REV. 151 (2013).

⁵ *The Next Rembrandt*, MICROSOFT (Apr. 13, 2016), <https://news.microsoft.com/europe/features/next-rembrandt>; Dutch Digital Design, *The Next Rembrandt: Bringing the Old Master back to life*, MEDIUM (Jan. 24, 2018), <https://medium.com/@DutchDigital/the-next-rembrandt-bringing-the-old-master-back-to-life-35dfb1653597>.

⁶ Gabe Cohn, *AI Art at Christie’s Sells for \$432,500*, N.Y. TIMES (Oct. 25, 2018), <https://www.nytimes.com/2018/10/25/arts/design/ai-art-sold-christies.html>; *Is artificial intelligence set to become art’s next medium?*, CHRISTIE’S (Dec. 12, 2018), <https://www.christies.com/features/a-collaboration-between-two-artists-one-human-one-a-machine-9332-1.aspx>; But see, e.g., Amanda Turnbull, *The price of AI art: Has the bubble burst?*, CONVERSATION (Jan. 6, 2020), <https://theconversation.com/the-price-of-ai-art-has-the-bubble-burst-128698> (It may appear that novelty of AI-generated portraits has worn off, as the new fad of acquiring non-fungible tokens has taken the world by storm. In November 2019, another in the Belamy series, *La Baronne de Belamy*, was sold at Sotheby’s for only US\$25,000).

⁷ Sarah Jacobs, *The 16 most expensive paintings ever sold*, BUS. INSIDER (May 15, 2019), <https://www.businessinsider.com/most-expensive-paintings-ever-sold-including-157-million-nude-modigliani-2018-5#12-pablo-picassos-le-rve-155-million-5> (*Meules* sold for US\$110.7 million and *Le Rêve* sold for US\$155 million).

$D \times [\log(D(x))] + z [\log(1 - D(G(z)))]$). In the field of music, the composition of polyphonic chorale music in the style of Johann Sebastian Bach by a deep learning neural network called DeepBach, developed by Gaetan Hadjeres and Francois Pachet at the Sony Computer Science Laboratories in Paris, has also made headlines in respect of AI-composed music.⁸

While “AI art” has been referred to as “neural network art”, many online commentaries do not make a clear distinction between whether the AI is used as a tool by a human individual (e.g. how internationally renowned artist Sougwen Chung uses hand-drawn and computer-generated marks in her drawings, sculptures and installation works, and Scott Eaton who creates and trains AI to translate his drawings and animation into photographic, figurative representations as well as abstracted sculptural forms⁹) or the AI independently and autonomously produces a work without supervision or significant human intervention. Although non-fungible tokens (NFTs) appear to be the rage in the art world at the point of writing,¹⁰ the copyright issues, albeit frequently misunderstood, are relatively straightforward.¹¹ This article will therefore focus only on delineating the meaning of authorship in relation to “AI art”.

Part II of this article demonstrates how the human authorship requirement is deeply entrenched in copyright jurisprudence. Part III will discuss the underlying theoretical rationales and the unequivocal judicial emphasis on “creativity”. Part IV contends that only AI-aided works (i.e., AI acting as amanuensis to assist or augment the efforts of natural persons in the creation of works), and *not* autonomous AI-generated works, should qualify for copyright protection. It proposes an evaluative framework to enable courts to clearly differentiate such AI-aided works from autonomous AI-generated works. Part V illustrates how a two-step analysis can be applied to different scenarios, using *The Next Rembrandt* as a baseline example. Part VI concludes that as

⁸ Emerging Technology from the arXiv, *Deep-Learning Machine Listens to Bach, Then Writes Its Own Music in the Same Style*, MIT TECH. REV. (Dec. 14, 2016), <https://www.technologyreview.com/2016/12/14/155416/deep-learning-machine-listens-to-bach-then-writes-its-own-music-in-the-same-style>; *Artificial Intelligence Writes a Piece in the Style of Bach: Can You Tell the Difference Between JS Bach and AI Bach?*, OPEN CULTURE (Jan. 24, 2018), www.openculture.com/2018/01/artificial-intelligence-writes-a-piece-in-the-style-of-bach.html.

⁹ Christopher McFadden, *7 of the Most Important AI Artists That Are Defining the Genre*, INTERESTING ENGINEERING (Nov. 10, 2019), <https://interestingengineering.com/7-of-the-most-important-ai-artists-that-are-defining-the-genre>; Sougwen Chung, *AI ARTISTS*, <https://aiartists.org/sougwen-chung>; Scott Eaton, *Artist + AI: Figures & Form in the Age of Intelligent Machines*, LUX REVIEW, www.lux-review.com/scott-eaton-artistai-figures-form-in-the-age-of-intelligent-machines.

¹⁰ Scott Reyburn, *JPG File Sells for \$69 Million as ‘NFT Mania’ Gathers Pace*, N.Y. TIMES (Mar. 11, 2021), <https://www.nytimes.com/2021/03/11/arts/design/nft-auction-christies-beeple.html>; Dana Thomas, *Dolce & Gabbana Just Set a \$6 Million Record for Fashion NFTs*, N.Y. TIMES (Oct. 4, 2021), <https://www.nytimes.com/2021/10/04/style/dolce-gabbana-nft.html>; Jacob Hale, *Top 10 most expensive NFTs ever sold*, DEXERTO (Mar. 15, 2022), <https://www.dexerto.com/tech/top-10-most-expensive-nfts-ever-sold-1670505/>.

¹¹ See, e.g., Andres Guadamuz, *The treachery of images: non-fungible tokens and copyright*, 16 J. INTELL. PROP. L. & PRAC. 1367 (2021); Pinar Çağlayan Aksoy & Zehra Özkan Üner, *NFTs and copyright: challenges and opportunities*, 16 J. INTELL. PROP. L. & PRAC. 1115 (2021).

AI systems become more sophisticated and even surpass human creativity, we should not lose sight of the fact that copyright laws are conceived to serve the progress of humanity and should always remain faithful to the centrality of human authorship.

II. THE HUMAN AUTHORSHIP REQUIREMENT

In his recent analysis of the concept of autonomy, Simon Chesterman notes: “what we mean when we describe an AI system as autonomous is not that it takes decisions ‘by itself’ but that it takes decisions *without further input from a human*.”¹² Much has been written in this area with a preponderance of views against the extension of copyright to computer-generated works as a result of autonomous decision making by AI systems, and this article would not be addressing each specific argument canvassed by different scholars.¹³ However, we would like to make some observations on the prevailing legislation and case law that govern the recognition of copyright in works. The UK’s Copyright, Designs and Patents Act 1988 (“CDPA”), Australia’s Copyright Act 1968 and Singapore’s Copyright Act 2006 divide copyright subject matter into two categories – original authors’ works and “subject-matter other than works.”¹⁴ In Singapore’s revamped Copyright Act 2021, the literary, dramatic, musical and artistic (LDMA) works are known as “authorial works”¹⁵ within the broad definition of “works” which comprise LDMA works and what used to be “subject-matter other than works” (e.g. sound recording, film and broadcast).¹⁶

The Commonwealth common law jurisdictions have consistently premised their copyright regimes on requiring human authorship. In *Asia Pacific Publishing Pte Ltd v. Pioneers & Leaders (Publishers) Pte Ltd*, the Singapore Court of Appeal cited the UK’s Copyright Act 1911 and CDPA as examples of copyright legislation implying human authorship, since they afforded copyright protection to authors for their *lifetime* plus 50 years. While section 9(3) of the CDPA appears to

¹² SIMON CHESTERMAN, *WE THE ROBOTS? REGULATING ARTIFICIAL INTELLIGENCE AND THE LIMITS OF THE LAW* 61 (2021).

¹³ See, e.g., Mauritz Kop, *AI & Intellectual Property, Towards an Articulated Public Domain*, 28 TEXAS INTELL. PROP. L. J. 297 (2020); Megan Svedman, *Artificial Creativity: A Case Against Copyright for AI-Created Visual Artwork*, 9(4) IP THEORY 1 (2020); Pratap Devarapalli, *Machine Learning to Machine Owning: Redefining the Copyright Ownership from the Perspective of Australian, US, UK and EU Law*, 40 EUR. INTELL. PROP. REV. 72 (2018); Massimo Maggiore, *Artificial Intelligence, Computer Generated Works and Copyright*, in NON-CONVENTIONAL COPYRIGHT: DO NEW AND ATYPICAL WORKS DESERVE PROTECTION? 382 (Enrico Bonadio & Nicola Lucchi eds., 2018); Andres Guadamuz, *Do Androids Dream of Electric Copyright? Comparative Analysis of Originality in Artificial Intelligence Generated Works*, 2 INTELL. PROP. Q. 169 (2017); Kalin Hristov, *Artificial Intelligence and the Copyright Dilemma*, 57(3) IDEA 431 (2017); James Grimmelman, *There’s No Such Thing as a Computer-Authored Work – and It’s a Good Thing, Too*, 39 COLUM. J. L. & ARTS 403 (2016).

¹⁴ The key reason for distinguishing original LDMA works from “subject-matter other than works” is because only LDMA works require originality in the sense of originating from a human author. In the earlier Singapore Copyright Act 2006, a “qualified person” for LDMA works is restricted to natural persons (s. 27(4)) while “qualified person” for “subject-matter other than works” includes “a body corporate incorporated under any written law in Singapore” (s. 81(1)(b)); Copyright Act, Ch. 6, (rev. ed., 2006) (Sing.).

¹⁵ Copyright Act 2021, s. 9 (Sing.).

¹⁶ Copyright Act 2021, s. 88 (Sing.).

afford copyright protection to computer-generated LDMA works even in the absence of a human author,¹⁷ it has been interpreted by courts to require the identification of a “causal link” between the computer-generated work and a human author.¹⁸ The English High Court affirmed the human authorship requirement in *Nova Productions Ltd v. Mazooma Games Ltd* when it applied the computer-generated work sections of the CDPA to the computer-generated composite frames, and identified the human programmer in that case as the author of these artistic works.¹⁹ Section 32(4) of the Australian Copyright Act 1968 clarifies that qualified persons refer to natural persons in respect of copyright subsistence in an original LDMA work.²⁰ Complementing the statutory approach, Australian case law, such as in *Telstra Corporation Ltd v. Phone Directories Company Pty Ltd* and more recently in *Acohs Pty Ltd v. Ucorp Pty Ltd*, requires that the “author” be an “actual person” and a “human author.”²¹

In Singapore, the highest appellate court in a 2017 decision in *Global Yellow Pages Ltd v. Promedia Directories Pte Ltd* affirmed its earlier comment in *Asia Pacific Publishing Pte Ltd v. Pioneers & Leaders (Publishers) Pte Ltd* regarding the “natural persons” requirement,²² where the same court held that for copyright to subsist in any literary work, the authorial creation must causally connect with the “engagement of the human intellect.”²³ The Court of Appeal then proceeded to define human intellect as “the application of intellectual effort ... or the exercise of mental labour,” which a non-human author is deemed to be unable to provide.²⁴ Furthermore, in Singapore’s new Copyright Act 2021, a suite of statutory provisions when read together indicate that only a human individual may be an “author”: (i) the duration provisions (s. 114) – where duration is pegged to the death of a person (i.e. 70 years after death unless in the case of anonymous/pseudonymous works); (ii) the “qualified individual” provision (s. 77) – where copyright in an *authorial* work subsists only if the author is a qualified individual;²⁵ (iii) the connecting factors provisions (ss. 109,

¹⁷ Copyright, Designs and Patents Act 1988, c. 48, § 9(3) (Eng.). Section 178 defines “computer-generated” as work that is “generated by computer in circumstances such that there is no human author of the work”.

¹⁸ JACOB TURNER, ROBOT RULES REGULATING ARTIFICIAL INTELLIGENCE 125 (2019).

¹⁹ *Nova Productions Ltd. v. Mazooma Games Ltd.* [2006] EWHC 24 (Ch), [12]-[18], [108].

²⁰ Copyright Act 1968, s. 32(4) (Austl.) (“qualified person means an Australian citizen or a person resident in Australia”).

²¹ *Telstra Corporation Ltd v. Phone Directories Company Pty Ltd* [2010] FCAFC 149, [100], [134] (Austl.); *Acohs Pty Ltd v. Ucorp Pty Ltd* [2012] 201 FCR 173, [57] (Austl.).

²² *Asia Pacific Publishing* [2011] 4 SLR 381, [82] (Sing.).

(“without the identification of a human author from whom the work originates, there can be no ‘original work’ capable of copyright protection”).

²³ *Global Yellow Pages Ltd v. Promedia Directories Pte Ltd*, [2017] 2 SLR 185, [24] (Sing.).

²⁴ *Id.*

²⁵ Copyright Act 2021, s. 77 (Sing.) (According to this provision, an individual is a qualified individual only if *he or she* is (a) a Singapore Citizen; or (b) a Singapore resident; or (c) an individual who, if he or she had been alive on 1 November 1957, would have qualified for Singapore citizenship under the repealed Singapore Citizenship Ordinance 1957).

110) that articulate the conditions for copyright to subsist in unpublished and published *authorial* works; and (iv) the moral rights provisions (ss. 370, 386, 387) – which refer to rights being personal in nature, and devolution of rights on death.

The Court of Appeal in *Asia Pacific Publishing* also noted that civil law jurisdictions treated authors' works as "emanations or extensions" of their personalities, based on the 19th-century European doctrine of *droit moral*. This was affirmed by the Court of Justice of the European Union (CJEU) on several occasions, especially in *Infopaq International v. Danske Dagblades Forening*.²⁶ Thus, copyright protection should subsist in these LDMA works to protect their authors' honour and reputations, which are inextricably connected to the works.²⁷ Similarly, the Berne Convention for the Protection of Literary and Artistic Works ("Berne Convention"), most of which has been incorporated into the WIPO Copyright Treaty²⁸ and the Agreement on Trade-Related Aspects of Intellectual Property Rights,²⁹ was drafted with a focus on human authors' rights in LDMA works.³⁰ Asian jurisdictions, like Japan, also require human authorship. The Copyright Law of Japan specifies that copyrightable works are "production[s] or works in which thoughts or sentiments are expressed creatively."³¹ The expression of creativity is understood as arising from the author's personality.

In the United States, while the Ninth Circuit Court of Appeals in *Naruto v. Slater*, which involved copyright in selfie photographs taken by a monkey, did not rule on the authorship issue, the court held that animals lacked statutory standing to sue under the Copyright Act.³² In a separate opinion, Circuit Judge Smith commented that even allowing next-friend standing would be against public policy and Supreme Court precedent:

²⁶ Case C-5/08, *Infopaq International A/S v. Danske Dagblades Forening*, [2009] E.C.R. I-6569, [37]. (The court held that copyright only applied to original works, and that originality must reflect the "author's intellectual creation" which was generally interpreted as including the human element of an author's personality.).

²⁷ *Asia Pacific Publishing*, [2011] 4 SLR 381, [57]-[58] (Sing.).

²⁸ WIPO Copyright Treaty, art. 1(4), Dec. 20, 1996, 2186 U.N.T.S. 121 (to which Singapore is a party).

²⁹ Agreement on Trade-Related Aspects of Intellectual Property Rights, art. 9(1), Apr. 15, 1994, Marrakesh Agreement Establishing the World Trade Organization, Annex 1C, 1869 U.N.T.S. 3 (which is incorporated into Singapore's World Trade Organisation commitments).

³⁰ *See, e.g.*, Berne Convention for the Protection of Literary and Artistic Works, art. 2, 6(2), Sept. 9, 1886, 828 U.N.T.S. 3. (Art. 2 refers to "author and his successors in title" and Art. 6(2) discusses the author's rights after his death). *See also*, Berne Convention for the Protection of Literary and Artistic Works, art. 7, Sept. 9, 1886, as revised at Berlin on Nov. 13, 1908, 828 UNTS 221 (which emphasised the human-centric focus when it extended the term of protection to 50 years after the author's death to cater to the higher life expectancies at that moment).

³¹ Chosakukenhō [Copyright Law], Law No. 48 of 1970, art. 2, para. (1)(i) (Japan).

³² *Naruto v. Slater*, 888 F.3d 418, 426 (9th Cir. 2018) ("If the statute does not so plainly state, then animals do not have statutory standing. The Copyright Act does not expressly authorize animals to file copyright infringement suits under the statute.").

Allowing next-friend standing on behalf of animals allows lawyers ... and various interest groups ... to bring suit on behalf of those animals or objects *with no means or manner to ensure the animals' interests are truly being expressed or advanced*. Such a change would fundamentally alter the litigation landscape. Institutional actors could simply claim some form of relationship to the animal or *object* to obtain standing and use it to advance their own institutional goals with no means to curtail those actions. We have no idea whether animals or *objects* wish to own copyrights or open bank accounts to hold their royalties from sales of pictures.³³

Indeed, these are strong policy reasons to prevent institutional actors who own the AI (“object”) from abusing the standing rules. But this can create an awkward fissure *if* the AI can be recognised as the author of a work, but is unable to have another individual or institution bring an action on its behalf for infringement. While US case law, unlike in the UK, Australia and Singapore, does not clearly state the requirement of a human author for copyright to subsist, the US Copyright Office, taking guidance from past cases like *Feist Publications, Inc., v. Rural Telephone Service Co.*,³⁴ only registers original works of authorship created by humans. Crucially, the Copyright Office clarifies that works “produced by a machine or mere mechanical process that *operates randomly or automatically* without any creative input or intervention from a human author” will not be registerable.³⁵ Based on the US Supreme Court’s 2019 unanimous decision in *Fourth Estate Public Benefit Corp. v. Wall-Street.com, LLC*, a copyright claimant must comply with the requirements of 17 U. S. C. §411(a) and may commence an infringement suit only when the Copyright Office registers a copyright.³⁶ Hence, if the Copyright Office refuses to register a copyright for works created by AI, then the enforcement of copyright becomes impossible, and the question of *autonomous* AI authorship is moot.

In summary, the authors contend that the human authorship requirement should not be abandoned even in the face of technological developments, as the collective wisdom of case law across numerous jurisdictions clearly demand the identification of a human author. As Ng-Loy Wee Loon succinctly observes: “a failure or inability to pinpoint the identity of the creator of the

³³ *Id.* at 432 (emphasis added).

³⁴ *Feist Publications*, 499 U.S. 340, 345 (1991) (The Supreme Court of the United States required that works contain some “creative spark” to satisfy the originality requirement and qualify for copyright protection).

³⁵ U.S. COPYRIGHT OFFICE, COMPENDIUM OF U.S. COPYRIGHT OFFICE PRACTICES §§ 300, 313.2 (3d ed. 2021). The rejection of an application by Stephen Thaler to register a two-dimensional AI-generated work titled “A Recent Entrance to Paradise” is currently being challenged. The plaintiff Thaler had identified the author of the work as the “Creativity Machine” and noted that it was “Created autonomously by the machine”. The US Copyright Office refused to register the claim based on lack of human authorship on August 12, 2019. *See* Thaler v. Perlmutter, Case 1:22-cv-01564 (filed June 3, 2022, D.D.C.).

³⁶ *Fourth Estate Public Benefit Corp. v. Wall-Street.com, LLC*, 139 S. Ct. 881 (2019).

work is fatal to a claim that the work is original. It is equally fatal if the outcome of the identification process points to a non-human as the creator of the work.”³⁷

III. THEORETICAL JUSTIFICATIONS AND THE REQUISITE STANDARD OF CREATIVITY

A. Theoretical Justifications for the Human Author

The economic utilitarian justification for copyright does not explicitly mandate human authorship. However, it does suggest that the delicate balance of various goals would be upset if copyright were conferred on works independently and autonomously generated by AI. It is widely accepted that the primary purpose of copyright as a limited monopoly is to promote the public good by protecting authors and other rights holders from uses of their works that unfairly appropriate the commercial value of their work, and to incentivise the production of more works for the public benefit.³⁸ Granting copyright protection to only AI-aided works incentivises to the extent necessary to encourage creativity, without disproportionately preventing reasonable access to works by the public.³⁹ However, providing copyright protection for autonomous AI-generated works would grant a monopoly to individuals and corporates who did not provide the requisite creativity that is connected to the creation of the final products. This is “disproportionate and excessive,”⁴⁰ and may cause “copyright stockpiling.”⁴¹

For AI-aided works, there is significant human intellectual input that contributes to their production process. Copyright protection prevents free riders from copying these works.⁴² This allows authors to recover “their fixed-cost investments” and incentivises them “to invest in the production of creative works.”⁴³ This is consistent with the copyright regime’s aim of benefiting

³⁷ Ng-Loy Wee Loon & David Tan, *Intellectual Property in LAW AND TECHNOLOGY IN SINGAPORE* 399, 403 (Simon Chesterman et. al. eds., 2021).

³⁸ See, e.g., *Sony Corp. of Am. v. Universal City Studios, Inc.*, 464 U.S. 417, 429 (1984); Pamela Samuelson, *Unbundling Fair Use*, 77 *FORDHAM L. REV.* 2537, 2617 (2009); *Global Yellow Pages Ltd v. Promedia Directories Pty Ltd*, [2017] 2 *SLR* 185, [74] (Sing.).

³⁹ See, e.g., Official Reports, Parliament of Singapore, Parliamentary Debates (Hansard), vol. 78, column 1070 (Nov. 16, 2004) (incentivising only to the extent necessary is consistent with legislative intention for Singapore’s copyright regime to preserve “the unimpeded exchange of information and ideas to create an environment which is conducive to the development of creative works.”).

⁴⁰ Courtney White & Rita Matulionyte, *Artificial Intelligence Painting the Bigger Picture For Copyright Ownership*, 30 *AUST. INTELL. PROP. J.* 224, 238 (2020) (Awarding copyright protection to AI-generated works is also inconsistent with the originality requirement); Daniel J. Gervais, *The Machine as Author*, 105 *IOWA L. REV.* 2053, 2061 (2020) (the author classifies AI-generated works as “noise” as they lack the intellectually transformative ability found in AI-aided or classic works).

⁴¹ Robert Yu, *The Machine Author: What Level of Copyright Protection Is Appropriate for Fully Independent Computer-Generated Works?*, 165 *U. PA. L. REV.* 1245, 1261-1263 (2017) (Yu argues that copyright stockpiling arises as AI algorithms can generate paintings faster than humans. Consequentially, the authors of these AI-generated works will be the bulk of authors. This dilutes and crowds out authors who produce AI-aided works or classic works).

⁴² White & Matulionyte, *supra* note 40, at 236.

⁴³ Christopher Yoo, *Copyright and Product Differentiation*, 79 *N.Y.U. L. REV.* 212, 215 (2004); Richard A. Posner, *Intellectual Property: The Law and Economics Approach*, 19 *J. ECON. PERSPECTIVE* 57, 60 (2005); *Sony Corp. of Am.*, 464 U.S. 717, at

“society by stimulating creativity through providing economic incentives to create new works.”⁴⁴ Courtney White and Rita Matulionyte argue that with AI systems already protected as literary works that comprise computer programs, extending further copyright protection to AI-aided works may be unwarranted since it is unclear if that “would lead to additional incentive and increased outputs.”⁴⁵ However, it has been said that the incentive to create general AI systems is different from the incentive to create AI systems that produce “commercially free-standing outputs whose value derives from their content”⁴⁶ for an “autonomous market.”⁴⁷ It was also argued that the lack of copyright protection for the final AI-generated works might stifle research on robot-creativity machines as “programmers are left with no means to reap the economic benefits associated with the distribution of the creations of their AIs, and therefore there is no tangible incentive to invest in the development of AI-applications.”⁴⁸

According to the natural rights theory, creators should be rewarded for their efforts in producing the authorial works.⁴⁹ Briefly, the theory refers to a basket of inalienable natural rights, including property; according to the philosopher, John Locke, people are entitled to own “whatever they have laboured on.”⁵⁰ The view of copyright protection as a means of safeguarding a creator’s personality or identity is attributable to the work of the German philosopher Hegel, and was also espoused by Immanuel Kant.⁵¹ The natural rights theory supports the recognition of copyright in AI-aided works, but extending copyright protection to autonomous AI-generated works is incongruent with the traditional Lockean theory that property rights attach to products of human labour.⁵² As the programmers of the algorithm that enables AI to independently and autonomously generate works cannot predict the works themselves, the human input lacks a

429 (The court recognised the ability of copyright to act as an incentive. It opined that copyright’s aim was to “motivate the creative activity of authors and inventors by the provision of a special reward, and to allow the public access to the products of their genius after the limited period of exclusive control has expired.”).

⁴⁴ David Tan, *The Transformative Use Doctrine and Fair Dealing in Singapore: Understanding the ‘Purpose and Character’ of Appropriation Art*, 24 SING. ACAD. L. J. 832, 833 (2012); *RecordTV Pte. Ltd. v. MediaCorp TV Singapore Pte. Ltd.*, [2011] 1 SLR 830, [69] (Sing.).

⁴⁵ White & Matulionyte, *supra* note 40, at 238.

⁴⁶ Ginsburg & Budiardjo, *supra* note 2, at 456.

⁴⁷ *Id.*

⁴⁸ Gabriele Spina Ali, *The Times They Are AI-Changin’: Copyright and Computer-Generated Works*, 27 AIDA 367, [5.2.1] (2018) (Other laws like patents, trade secrets and contract do not prevent the unauthorised reproduction of the computer-generated works).

⁴⁹ David Tan & Chan Yong Neng, *Copyright Subsistence in Contemporary Times: A Dead Shark, An Unmade Bed and Bright Lights In An Empty Room*, 25 SING. J. LEGAL STUD. 402, 405 (2013).

⁵⁰ JANICE GRAY ET. AL., *PROPERTY LAW IN NEW SOUTH WALES* 14 (4th ed., 2018).

⁵¹ Roberta Rosenthal Kwall, *The Right of Publicity vs. The First Amendment: A Property and Liability Rule Analysis*, 70 IND. L. J. 47, 57-59 (1994).

⁵² JUSTINE PILA, *THE SUBJECT MATTER OF INTELLECTUAL PROPERTY* 70 (2017) (Traditionally, courts extended the Lockean theory to intellectual property by reasoning that since literary works are the fruits of literary labour, they are protected by property rights vesting in their creators at common law).

sufficient nexus to the final product.⁵³ In contrast, the creation of AI-aided works requires the exercise of one's intellect, which is a sufficient act of labour that natural rights theorists regard as capable of justifying copyright protection.

While this theory initially referred to tangible property, increasing numbers of scholars have consistently applied natural right theory to intellectual property.⁵⁴ Justine Pila, drawing on the Hegelian view of personhood and property, argues that authorship involves “the instantiation of personhood and the realization of individual freedom in the external (non-subjective) sphere, via the creation of objects separate from but reflecting the self.”⁵⁵ This was emphasised in the European Union as well, where, the CJEU in *Cofemel-Sociedade de Vestuário SA v. G-Star Raw CV* emphatically held that “the fact remains that the circumstance that a design may generate an aesthetic effect does not, in itself, make it possible to determine whether that design constitutes an intellectual creation reflecting the freedom of choice and personality of its author.”⁵⁶ Specifically, “it is both necessary and sufficient that the subject matter reflects the personality of its author, as an expression of his free and creative choice.”⁵⁷ To acquire copyright in a work, European courts today require that the author must be able to express his or her creative abilities in the production of the work by making free and creative choices.⁵⁸ Gabriele Spina Ali phrases this requirement as discerning a “trace of the user's personal mark in the output” in relation to works generated by computers.⁵⁹ This requirement of human creativity in authorship is inextricably intertwined with originality. Jyh-An Lee notes that originality “reflects the author's creativity in the copyright work”.⁶⁰ Unlike humans, machines are unable to fulfil the *sine qua non* of authorship – “creativity”. While “creativity” is often assumed to be a fundamental component of authorship – e.g. the requirement of a “creative spark” in compilation works by the US Supreme Court⁶¹ – it is often underexplored in judicial decisions and in academic writings.⁶² The focus tends to be on “originality” which interrogates whether the work *originated* with the author, that it was not merely copied from another work, and that the creation of the work required some independent

⁵³ Shlomit Yanisky-Ravid, *Generating Rembrandt: Artificial Intelligence, Copyright, and Accountability in the 3A Era – The Human-Like Authors are Already Here – A New Model*, MICH. ST. L. REV. 659, 701 (2017).

⁵⁴ Gervais, *supra* note 40, at 2077; Pila, *supra* note 52, at 70; Jyh-An Lee, *Computer-generated Works under the CDPA 1988*, in ARTIFICIAL INTELLIGENCE & INTELLECTUAL PROPERTY 171, 186 (Jyh-An Lee et. al. eds., 2021).

⁵⁵ Justine Pila, *The Authorial Works Protectable by Copyright*, in ROUTLEDGE HANDBOOK OF EU COPYRIGHT LAW 63, 78 (Eleonora Rosati ed., 2021).

⁵⁶ *Cofemel-Sociedade de Vestuário SA v. G-Star Raw CV*, Case C-683/17, EU:C:2019:721, (Sept. 12, 2019), [54].

⁵⁷ *Id.* at [30].

⁵⁸ *Eva-Maria Painer v. Standard Verlags GmbH*, Case C-145/10, [2011] ECR I-12533, [87]-[89], [94].

⁵⁹ Ali, *supra* note 48, [6.3.3].

⁶⁰ Lee, *supra* note 54, at 184.

⁶¹ *Feist Publications*, 499 U.S. 340, 345 (1991).

⁶² Anna Shtefan, *Creativity and artificial intelligence: a view from the perspective of copyright*, 16 J. INTELL. PROP. L. PRAC. 720, 720, 724 (2021).

intellectual effort, but artistic merit or novelty or inventiveness as required in patent law should not be taken into account.⁶³ The authors are of the view that a better understanding of creativity as emanating from human personality is critical in understanding why the activities of AI cannot be perceived as “creative” no matter how artistic or novel the output works may be.

Ginsburg and Budiardjo identify this creative element as the conception element, which they contend to be one of the two elements of authorship, the other being the execution element.⁶⁴ On the conception element, present AI systems are “fundamentally sets of processes designed by humans to accomplish specific tasks” that cannot conceptualise and determine the outcome independently.⁶⁵ Despite their outputs being ostensibly creative and sufficiently artistic to be perceived as created by human artists, there is a gap in reasoning if one were to equate the seeming equivalent in output with the equivalence in the creative process. Human input is still required to set the parameters and outcome. Therefore, if one recognises AI as a new form of legal person, capable of becoming authors, it would fundamentally disregard these crucial distinctions.⁶⁶ Anna Shtefan has compellingly argued that creativity is “a process of personal expression” and “it includes both self-knowledge and cognition and re-thinking of the world”.⁶⁷

For the execution element, although the human does not always physically generate the work, human authorship is still justified as the execution element only requires the author to maintain control over the execution process. Besides the international shift to the “creativity” approach which emphasises “conception” over “execution,” the author-principal’s relationship with its amanuensis⁶⁸ and the human-tool relationship permit authors to delegate the physical execution process.

The relationship between human authors and AI systems can be analogised to the agency relationship for amanuenses, which involves the primary actor detailing the creative process for the secondary actor to execute.⁶⁹ As the agent-amanuensis is under the direction and control of the principal-author, the agent-amanuensis’s acts are considered the principal’s authorial acts.⁷⁰ It

⁶³ *E.g. Feist Publications*, 499 U.S. 340, 344-346 (1991); *IceTV*, (2009) 239 CLR 458, 474 (Austl.).

⁶⁴ Ginsburg & Budiardjo, *supra* note 2, at 347.

⁶⁵ *Id.* at 401.

⁶⁶ Gerald Spindler, *Copyright Law and Artificial Intelligence*, 50 IIC 1049, 1049 (2019).

⁶⁷ Shtefan, *supra* note 62, at 721.

⁶⁸ Ginsburg & Budiardjo, *supra* note 2, at 354 (Ginsburg and Budiardjo explain that amanuenses are akin to scribes or modern-day secretaries, and perceived as “agents” of the author-principals).

⁶⁹ This is different from a work-for-hire doctrine as the agent-amanuensis’s acts are attributed to the author-principal, unlike the work-for-hire doctrine which enables the employer to claim his employees’ work by virtue of their employment relationship.

⁷⁰ *Andrien v. S. Ocean City Chamber of Commerce*, 927 F.2d 132 (3d Cir. 1991).

is only when the agent-amanuensis goes on a “frolic of [its] own,”⁷¹ without any of the principal-author’s influence,⁷² that it usurps its principal’s authorship. However, as today’s AI systems are still incapable of straying from their human principals’ creative plans, they can be regarded unproblematically as agents or tools of the human authors who develop and utilise them.⁷³

Furthermore, the human-tool relationship justifies human authorship despite the black-box problem⁷⁴ because the black-box problem is inconsequential to the authorship issue. Authorial control does not require the author to understand the machine. The programmer still controls the machine’s fundamental process, even if the machine can improve its own internal processes and certain technicalities may be beyond the programmer’s understanding. The programmer sets the parameters, data inputs, goals, optimisation process and time of commencement.⁷⁵ In a similar context, a photographer does not forfeit his authorship claim over his photographs merely because he does not understand the camera’s mechanical and chemical processes,⁷⁶ if he formulated the placement of the “existing object[s]” and their lighting to express his intellectual conception of the images,⁷⁷ such that the photographs reflect the photographer’s personality.⁷⁸ Therefore, as human authors dictate the conception and execution processes, sophisticated machines should still be regarded as tools or agents instead of authors. Section 178 of the CDPA defines “computer-generated”, in relation to a work, as meaning “that the work is generated by computer in circumstances such that there is no human author of the work”. However, this has to be read with s. 9(3) of the CDPA which states that “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”. These two provisions when read together does *not* mean that AI can be an “author” in English law. As the court in *Nova Productions* had held, the CDPA still requires a human author to perform necessary arrangements to create the work.⁷⁹ Thus, human authorship is justified via the conception and execution elements

⁷¹ *Joel v. Morison* (1834) 172 Eng. Rep. 1338 (Eng.). This “time-honoured catch phrase” is drawn from vicarious liability jurisprudence. See *Dubai Aluminium Co. Ltd. v. Salaam* [2003] 2 AC (HL) 366, [32] (Eng.); *WM Morrison Supermarkets v. Various Claimants* [2020] UKSC 12, [47] (Eng.).

⁷² *Geshwind v. Garrick*, 734 F. Supp. 644, 649 (S.D.N.Y. 1990).

⁷³ This is consistent with s. 9(3) of the CDPA intending to track the most relevant human intervention related to the work’s production, which the court in *Nova Productions* interpreted as recognising the programmer as author of computer-generated artistic works.

⁷⁴ Michael L. Rich, *Machine Learning, Automated Suspicion Algorithms, and the Fourth Amendment*, 164 U. PA. L. REV. 871, 886 (2016) (according to Rich, the black-box problem arises when AI systems are so sophisticated that “the original programmers of the algorithm have little idea exactly how or why the generated model” achieves its goal).

⁷⁵ Ginsburg & Budiardjo, *supra* note 2, at 407.

⁷⁶ See, *Nottage v. Jackson* (1883) 11 Q.B.D. 627 (Eng.) (where it was held that the photographer was the author.)

⁷⁷ *Burrow-Giles Lithographic Co. v. Sarony*, 111 U.S. 53, 54 (1884).

⁷⁸ *Eva-Maria Painer*, Case C-145/10, [2011] ECR I-12533, [85]-[88].

⁷⁹ *Nova Productions Ltd v. Mazooma Games Ltd*, [2006] EWHC 24 (Ch), [105] (Eng.).

– this is an important rationale for attributing the creation of the final work to a human author when such a nexus is found.

In addition, the human authorship requirement is supported by the *droit d’auteur* principle in civil law jurisdictions, the utilitarian theory in Commonwealth jurisdictions, and natural rights theory. The *droit d’auteur* principle defends the human authorship requirement by regarding copyright as a means to protect the author’s personality embodied in his artwork, which is non-existent in works autonomously generated by computers.⁸⁰ Unlike civil law jurisdictions, the utilitarian theory of copyright protection in Commonwealth common law jurisdictions relies on incentivising creators to produce artworks by preventing their labour and investments from being misused by third parties.⁸¹ Since only humans, and not computers, can be incentivised to produce paintings, the utilitarian theory requires human authorship in order to function. Separately, the natural rights theory’s human-centric focus affirms the human authorship requirement. The concept of an “author” of an intellectual work being the “natural” holder of rights in that work first appeared during the thirteenth century.⁸² The Universal Declaration of Human Rights subsequently recognised these rights as a human right when it elevated them to universal status.⁸³

B. The Requisite Standard of Creativity

One must be careful not to equate “value” with “creativity” in copyright law. It has been pointed out by Mark Runco and Garrett Jaeger that “originality is vital for creativity but it is not sufficient.”⁸⁴ Effectiveness, in the sense of the work or product being successful in the market, may take the form of value, but one cannot logically associate the notion of creativity with the effectiveness of its economic result. We are unlikely to say that the installation work of an avant-garde artist is not creative even though no one buys it. However, we should not draw a conclusion that just because a work sells for a high price, it is necessarily creative in the context of copyright; otherwise, copyright law would have to protect everything of value, and the criterion of originality with its concomitant requirement of creativity would be rendered nugatory.⁸⁵ The authors agree

⁸⁰ Ali, *supra* note 48, at [6.3].

⁸¹ *Id.* at [7.2].

⁸² Gervais, *supra* note 40, at 2073.

⁸³ G.A. Res. 217 (III) A, Universal Declaration of Human Rights, (Dec. 10, 1948) (sets out “the right to the protection of the moral and material interests resulting from any scientific, literary or artistic production of which he is the author.”).

⁸⁴ Mark A. Runco & Garrett J. Jaeger, *The Standard Definition of Creativity*, 24 CREATIVITY RES. J. 92, 92 (2012).

⁸⁵ See, Brian L. Frye, *Against Creativity*, 11 N.Y.U. J. L. LIBERTY 426, 454 (2017) (there are contrary views regarding the recognition of the primacy of creativity in copyright law, with at least an author recently arguing that copyright should “ignore ‘creativity’ and focus instead on economic value).

with Anna Shtefan that “the rejection of creativity as the basis of copyright would be unacceptable”.⁸⁶

It is worth exploring Shtefan’s detailed description of “creativity” which essentially gives substance to the familiar notion of an “intellectual creation” found in many copyright statutes. She explains the creative process that happens in the mind of an author who ultimately produces a work as follows:

The creative process takes place in the subconscious mind, which generates various images, feelings, emotions, and transmits them to consciousness. Consciousness perceives these images and makes decisions about how they can be embodied in any form. Conscious comprehension of the impulses and enlightenments in the subconscious mind is necessary for persons to express their ideas in an objective form using some tools ... Consciousness performs an auxiliary function selecting the form of expression for the results of creativity and controlling the process of modelling it.⁸⁷

In the language of originality, it is the presence of the author’s own choice or volitional path in the creation of a work – as a result of the conscious mind (entailing rules of logic) and subconscious mind (involving fantasy, imagination, intuition and premonition) working together – that makes a work “original”.⁸⁸ Daryl Lim explains that AI augments what authors and inventors can do, but “while such AI technology assists artists in giving form to their expression, artists wield them while continuing to express their own intelligence, insight, and inspiration through creative processes.”⁸⁹ Copyright law in the US confers protection to “the fruits of intellectual labor ... found in the *creative powers of the mind*.”⁹⁰

In Singapore, the Court of Appeal in *Asia Pacific Publishing*⁹¹ and, more recently, *Global Yellow Pages Ltd* endorsed the “creativity” approach over the “sweat of the brow” approach, when ascertaining the originality of a work – in that case, a compilation work. The latter approach examines the author’s “labour and industry” as well as effort during the preparatory stage, while the former approach focuses on work being “causally connected with the engagement of the *human intellect* [emphasis added]” when developing the expression of the work.⁹² The focus of the court is on the “intellectual creation” which the court explains as follows:

⁸⁶ Shtefan, *supra* note 62, at 724.

⁸⁷ *Id.* at 725.

⁸⁸ *Id.*

⁸⁹ Daryl Lim, *AI & IP: Innovation & Creativity in an Age of Accelerated Change*, 52 AKRON L. REV. 813, 831 (2018).

⁹⁰ *Id.* at 838 (citing *In re Trade-Mark Cases*, 100 U.S. 82, 94 (1879)).

⁹¹ *Asia Pacific Publishing*, [2011] 4 SLR 381, [18] (Sing.).

⁹² *Global Yellow Pages*, [2017] 2 SLR 185, [23]-[24] (Sing.).

By the human intellect, we mean the application of intellectual effort, creativity, or the exercise of mental labour, skill or judgment. Effort (even intellectual) that is applied *not* towards the authorial creation but towards other ends such as the verification of facts will not be relevant in this context even if such verified facts might be the eventual subject of the authorial creation.⁹³

Likewise, there is also an international departure from the “sweat of the brow” approach, such as in Australia, the US, and the EU. The High Court of Australia departed from the “sweat of the brow” approach, after casting doubt on *Desktop Marketing Systems Pty Ltd v. Telstra Corporation Ltd*⁹⁴ and citing the US Supreme Court’s landmark decision of *Feist* with approval. The European Union also adopts the “creativity” approach. In *Football Dataco Ltd and Others v. Yahoo! UK Ltd and Others*,⁹⁵ the CJEU examined whether the author, in setting up a database, expressed his creativity in an original manner by making free and creative choices, to determine whether the database fulfilled the originality requirement.⁹⁶ The CJEU’s position in *Yahoo!* is consistent with a lineage of past cases, such as *Infopaq*,⁹⁷ *Painer*,⁹⁸ and the recent *Cofemel*.⁹⁹ Besides compilations, other works must also be the author’s own *intellectual creation* to satisfy the originality requirement. This intellectual creation must reflect the author’s personality and express his “free and creative choices” made during production.¹⁰⁰ Justine Pila summarises the EU two-stage test as follows: “At the first stage, the Court asks whether the work is of a type that affords scope for the exercise of free and creative choices (formative freedom) in its production. At the second stage, it asks whether the person claiming authorship of the work has exploited the scope sufficiently to produce a work that is her own intellectual creation in the sense of reflecting her personality.”¹⁰¹

The level of creativity required for copyright to subsist is universally regarded to be “extremely low”¹⁰² in the assessment of originality of LDMA works when it is assumed that the works are the expressions of human authors. Across jurisdictions, while courts use different languages to describe the required standard of creativity, “the differences in language are essentially

⁹³ *Global Yellow Pages Ltd*, [2017] 2 SLR 185, [24] (Sing.).

⁹⁴ *Desktop Marketing Systems Pty Ltd v. Telstra Corporation Ltd*, (2002) 119 FCR 491 (Austl.).

⁹⁵ *Football Dataco Ltd and Others v. Yahoo! UK Ltd and Others*, Case C-604/10, EU:C:2012:115, (Mar. 1, 2012).

⁹⁶ *Nova Productions*, [2006] EWHC 24 (Ch), [105] (The UK’s adoption of the “creativity” approach is consistent with s. 9(3) of the CDPA and *Nova Productions*. The EWHC in *Nova Productions* examined the programmer’s creative contributions in crafting the appearance of each composite frame when interpreting s. 9(3)).

⁹⁷ *Infopaq Int’l v. Danske Dagblades Forening*, Case C-5/08, [2010] FS.R 20.

⁹⁸ *Eva-Maria Painer*, Case C-145/10, [2011] E.C.R. I-12533.

⁹⁹ *Cofemel-Sociedade*, Case C-683/17, EU:C:2019:721.

¹⁰⁰ *Infopaq Int’l*, Case C-5/08, [2010] FSR 20, [35]; *Eva-Maria Painer*, Case C-145/10, [2011] E.C.R. I-12533, [99]; PILA, *supra* note 52, at 65-66.

¹⁰¹ PILA, *supra* note 52, at 71.

¹⁰² *Feist Publications*, 499 U.S. 340, 345 (1991); *Asia Pacific Publishing*, [2011] 4 SLR 381 at [38].

semantic” without any “meaningful difference in standards.”¹⁰³ In *IceTV Pty Ltd v. Nine Network Australia Pty Ltd*, the High Court of Australia agreed with the US Supreme Court’s decision in *Feist* that there must be some “creative spark”¹⁰⁴ to constitute “independent intellectual effort” or “sufficient effort of a literary nature.”¹⁰⁵ This “creative spark” only necessitated a “minimal degree of creativity” that was “extremely low” such that “even a slight amount will suffice.”¹⁰⁶ However, the mere fact that a work generates an aesthetic effect is insufficient on its own to establish its originality.

IV. A PROPOSED FRAMEWORK FOR IDENTIFYING THE HUMAN AUTHOR OF AN AI-GENERATED WORK

There is currently a dearth of case law on how to distinguish between human-authored works that are assisted or augmented by AI, and works that are *independently and autonomously* generated by AI. English decisions like *Nova Productions* in the interpretation of sections 9(3) and 178 of the CDPA are not instructive as the human author was clearly identified and not an issue.¹⁰⁷ Both categories of works are generated by computers or AI, but for the purposes of classification, we will refer to the former category as “AI-aided” works and the latter as “AI-authored” works.

Regarding legislative recognition, an uncoordinated patchwork of provisions can be found in a handful of Commonwealth jurisdictions. The Singapore Academy of Law’s Law Reform Committee recognises that given AI’s increasing capabilities, AI-generated works are inevitable. Thus, it recognised the need for statutory reform on copyright protection for computer-generated works and, in particular, contemplated adopting s. 9(3) of the UK’s CDPA.¹⁰⁸ While provisions similar to s. 9(3) also appear in India,¹⁰⁹ Ireland,¹¹⁰ New Zealand¹¹¹ and Hong Kong¹¹² (with the “author” of the computer-generated work considered to be the person who completed “the arrangements necessary for the creation of the work”), Singapore’s latest copyright review declined

¹⁰³ *Global Yellow Pages*, (2017) 2 SLR 185, [27].

¹⁰⁴ *IceTV*, (2009) 239 CLR 458, [187].

¹⁰⁵ *IceTV*, (2009) 239 CLR 458, [33], [99].

¹⁰⁶ *Feist Publications*, 499 U.S. 340, 345 (1991).

¹⁰⁷ *Nova Productions*, [2006] EWHC 24 (Ch) [105] (“In so far as each composite frame is a computer-generated work then the arrangements necessary for the creation of the work were undertaken by Mr Jones because he devised the appearance of the various elements of the game and the rules and logic by which each frame is generated and he wrote the relevant computer programme”).

¹⁰⁸ LAW REFORM COMMITTEE, SINGAPORE ACADEMY OF LAW, *RETHINKING DATABASE RIGHTS AND DATA OWNERSHIP IN AN AI WORLD*, [2.76] (2020).

¹⁰⁹ Copyright Act 1957, No. 14, Acts of Parliament 1957, s. 2(d)(v) (India).

¹¹⁰ Copyright and Related Rights Act (Act No. 28/2010) s. 21(f) (Ir.), <https://www.irishstatutebook.ie/eli/2000/act/28/enacted/en/print>.

¹¹¹ Copyright Act 1994, s. 5(2)(a) (N.Z.).

¹¹² Copyright Ordinance 1997, Cap 528, Acts of Parliament 1994, s. 11(3) (H.K.).

to consider this matter.¹¹³ The preference for the Singapore government is to leave it to the courts to determine when a work generated by AI or computers would be an “authorial work” in the new Copyright Act 2021. The Act, however, offers no further assistance to the courts on how they may properly evaluate such works. As a result, the Singapore courts would have to look to the scant case law in comparable Commonwealth common law jurisdictions. Section 9(3) of the CDPA has been criticised for being inconsistent with the originality requirement¹¹⁴ because it provides copyright protection for computer-generated works which lack the intellectual creation component required to be original.¹¹⁵ The uncertainty arising from whether the programmer or user is the “author” – the identification of which is necessary pursuant to s. 9(3) – has also been highlighted.¹¹⁶ When the CDPA’s computer-generated work provision was enacted in the 1980s, the legislators had only a rudimentary understanding of the notion of AI,¹¹⁷ and did not anticipate the sophisticated and advanced AI capabilities in the 21st century.¹¹⁸ While s. 9(3) of the CDPA may appear to be ahead of its time, its clumsy language does seem to hinder its effectiveness; in a roundabout way, a human author still needs to be identified. It was only considered once by the English courts in *Nova Productions*. Furthermore, as *Nova Productions* did not involve any AI technology at all,¹¹⁹ ascertaining the author in today’s AI setting is much more challenging than it was in *Nova Productions*.

AI-aided works are clearly original as courts treat the AI systems as tools or agents, i.e. AI as amanuensis, that aid the human author to render ideas into expression.¹²⁰ In *Express Newspapers plc v. Liverpool Daily Post & Echo*, an early case which concerned AI-aided work, the court likened a

¹¹³ MINISTRY OF LAW AND INTELLECTUAL PROPERTY OFFICE OF SINGAPORE, SINGAPORE COPYRIGHT REVIEW REPORT (Jan. 17 2019), https://www.mlaw.gov.sg/files/news/public-consultations/2021/copyrightbill/Annex_A-Copyright_Report2019.pdf.

¹¹⁴ See e.g., Ali, *supra* note 48 [6.3.3].

¹¹⁵ See, Emily Dorotheou, *Reap the Benefits and Avoid the Legal Uncertainty: Who Owns the Creations of Artificial Intelligence?*, 21(4) COMPUT. & TELECOM. L.R. 85, 87 (2015). (Dorotheou explains that the author of a non-computer-generated work contributes creatively, while the author of a computer-generated work (this paper considers the type of computer-generated work that Dorotheou refers to as AI-generated work due to the lack of human creative input) merely undertakes the necessary arrangements for the creation of the work, under s. 9(3) of the CDPA. During the enactment of the CDPA, Lord Beaverbrook clarified that this person “will not himself have made any personal, creative efforts.” Thus, the work would have failed the originality requirement.)

¹¹⁶ Toby Bond & Sarah Blair, *Artificial Intelligence & copyright: Section 9(3) or authorship without an author*, 14 J. INTELL. PROP. LAW. & PRAC. 423, 423 (2019).

¹¹⁷ Yanqing Duan et. al., *Artificial Intelligence for Decision Making in the Era of Big Data – Evolution, Challenges and Research Agenda*, 48 INT. J. INFO. MGMT. 63, 64 (2019).

¹¹⁸ Julia Dickenson et. al., *Creative Machines: Ownership of Copyright in Content Created by Artificial Intelligence Applications*, 39 EUROPEAN INTELL. PROP. R. 457, 458 (2017).

¹¹⁹ See, *Nova Productions* [2006] EWHC 24 (Ch). As *Nova Productions* concerned the display of a sequence of computer-generated frames, it is arguable that *Nova Productions* is of limited authority for arguing that programmers are always authors of today’s computer-generated works.

¹²⁰ Enrico Bonadio et. al., *Intellectual Property Aspects of Robotics*, 9 EUROPEAN J. RISK REG. 655, 667 (2018).

computer to a pen in that both were tools, and that it would be “unrealistic... to suggest that, if you write with a pen, it is the pen that is the author of the work rather than the person who drives the pen.” Therefore, the court regarded the programmer as the author because he programmed the computer and invested “a great deal of skill and labour.”¹²¹

The analogising of a computer to a pen was applied to distinguish between AI-aided and AI-authored works in the decision of the Supreme Court of South Africa in *Payen Components S.A. Ltd v. Bovic CC and Others*.¹²² In contrast to AI-aided works, AI-authored works should be deemed “authorless” works because the computer, through a deep learning process, had undertaken the creative process independently and autonomously without specific human instruction and input.¹²³ The court noted:

There is now a crucial distinction between a computer-aided work, as in the above case (the *Express Newspaper* case), and a computer-generated work. The latter work is one which is created without expenditure of significant human skill and effort in the completed work. For example, the compilation of new crossword puzzles, moves generated by computer chess programs or computer-generated original pieces of music in the style of a known composer. The steps to be taken by the operator of the machine may be so trivial (that it is difficult on normal principles to say that he or she is the author. The real creative work is done by the person who devises the original computer program, but it would be inconvenient and misleading to treat that programmer in all cases as the owner of the copyright in the new works which his program produces, for example, in all the new music produced by the various programs which are sold to the public.¹²⁴

The crucial question before the South African court was whether the plaintiff Payen Components could prove “that there was a human author, in other words that the printout was not computer-generated” but was a result of the input of or instructions given by a human individual.¹²⁵ On the evidence before the court, details of which were not clearly articulated in the judgment, it was satisfied that “enough evidence has been produced” to find copyright in the catalogue cum price list.¹²⁶

¹²¹ *Express Newspapers plc v. Liverpool Daily Post & Echo* [1985] 1 WLR 1089, 1093.

¹²² *Payen Components South Africa Ltd. v. Bovic Gaskets CC and Others* (448/93) [1995] ZASCA 57, [13].

¹²³ *Id.* at [13]. *See also*, Gervais, *supra* note 40, at 2094.

¹²⁴ *Payen Component,s* [1995] ZASCA 57, [13] (citing GERALD DWORKIN AND RICHARD TAYLOR, BLACKSTONE'S GUIDE TO THE COPYRIGHT DESIGN AND PATENTS ACT 185 (1988)).

¹²⁵ *Payen Components*, [1995] ZASCA 57, [18].

¹²⁶ *Payen Components*, [1995] ZASCA 57, [19]-[20].

What is clear today is that when the human input lacks a “sufficient causal nexus with the final work”,¹²⁷ then the human author, from whom a work originates, cannot be identified.¹²⁸ As a result, what we have is an authorless work – no matter how aesthetic, useful or valuable. This was pointed out in *Payen Components*:

There may be cases where the real work has been done by the computer, the human contribution being too trivial or not sufficiently related to the work that has emerged. Suppose a computer linked directly to a large number of meteorological instruments and programmed automatically to print out a weather chart on demand. It seems factually wrong to contend that the deviser of the program is the ‘author’ of the chart. He may have died many years ago, the program may have been bought in from an independent software house, yet every day quite different charts are printed out. ... It is perhaps even more artificial to argue that the operator of the computer is the author: the only skill and labour he had employed is ensuring that the flow of programs and data to the machine is maintained. It might be said that the real author is the owner or hirer of the computer who has expended the capital in setting up and operating the system; but such person is probably a body corporate, and if considered to be the ‘author’, would enjoy a potentially perpetual copyright.¹²⁹

However, it can be seen from these hypothetical scenarios that the line which delineates human-authored AI-aided works from autonomous AI-authored works is unclear.¹³⁰

We propose the following inquiry that may be useful for courts to consider when attempting to determine whether a human author who has a sufficient causal nexus with the final work can be identified: (a) Did the human author (as claimed) conceive and execute his or her creative plan? (b) Did the plan satisfy the level of creativity required? The proposed framework can comfortably fit into the present approach in many jurisdictions in respect of protection for LDMA works.¹³¹ It is in line with the majority view in academic and judicial discussions that the author of a work generated by a computer should be the programmer who wrote the algorithm(s)

¹²⁷ *Global Yellow Pages*, [2017] 2 SLR 185, [24].

¹²⁸ *Asia Pacific Publishing*, [2011] 4 SLR 381, [82] (where the court held that “without the identification of a human author from whom the work originates, there can be no ‘original work’ capable of copyright protection.”).

¹²⁹ *Payen Components*, [1995] ZASCA 57 [15] (citing LADDIE, PRESCOTT AND VITORIA: THE MODERN LAW OF COPYRIGHT (2nd ed) (1995)).

¹³⁰ Bond & Blair, *supra* note 116, at 423.

¹³¹ There is also a specific four-step test recently proposed for the examination of whether AI-assisted output can qualify as a “work” protected under EU law: (i) production in literary, scientific or artistic domain; (ii) human intellectual effort; (iii) originality/creativity (creative choice); (iv) expression. *See*, P. Bernt Hugenholtz & João Pedro Quintais, *Copyright and Artificial Creation: Does EU Copyright Law Protect AI-Assisted Output?*, 52 INT’L REV. INTELL. PROP. & COMP. L. 1190 (2021).

that generated the work,¹³² but goes a step further in offering an analytical tool to evaluate relative contributions of different human individuals in the process of creating the final work. It obviates an antecedent distinction between works that are generated by AI and works that are not. It goes straight to the heart of what really matters in the canons of copyright law – authorship and originality/creativity. We will discuss each stage of the test in turn below.

A. Did the human author conceive and execute his or her creative plan?

To fulfil the conception and execution elements articulated by Ginsburg and Budiardjo and be deemed the author of an AI-aided work, a human author is only required to formulate a creative plan and execute it. This creative plan is “manifested in the [programme]’s algorithms and processes, which will directly lead to the creation of expressive content.”¹³³ Regarding the conception element, the author is not expected to have a clear pre-determined conception “of what the work should look like”; an “intent” to create a particular kind of LDMA work will suffice.¹³⁴ The execution of the work completes the artist’s conception and recognises him as the author. This is because the elements in the final work stem *directly from the author’s decisions* when formulating his or her creative plan.¹³⁵

The non-necessity of a complete conception is supported by the notion of “accidental authorship,” which Ginsburg and Budiardjo define as a work created by an author “without precise foresight of the work’s ultimate form or contents.”¹³⁶ Imagine in an alternate universe of *Naruto*, where the facts become such that Slater’s camera captures an unexpected attack on the macaque Naruto by other monkeys. Such an outcome will vary significantly from the photograph Slater had in mind when he set up his camera to capture the photograph of a *single* monkey selfie-style. However, as with photographers in general, one instinctively feels that despite not knowing the exact image he ends up creating, Slater can still stake an authorship claim over the final photograph so long as he had selected and arranged particular elements in the execution of a creative plan. This is consistent with industry practice and legal jurisprudence. Many wildlife photographers rely on remote cameras to capture images after meticulously setting up the motion-sensor

¹³² See e.g., Lee, *supra* note 54, at 187; Peter K. Yu, *Data Producer’s Right and the Protection of Machine-Generated Data*, 93 TULANE L. REV. 859, 904 (2019); Dickenson et. al., *supra* note 118, at 458-9; Bruce E. Boyden, *Emergent Work*, 39 COLUM. J.L. & ARTS 337, 384 (2016); Lin Weeks, *Media Law and Copyright Implications of Automated Journalism*, 4 N.Y.U. J. INTEL. PROP. & ENT. L. 67, 92 (2014).

¹³³ Ginsburg & Budiardjo, *supra* note 2 at 414.

¹³⁴ *Lindsay v. The Wrecked and Abandoned Vessel R.M.S. Titanic*, 97 Civ. 9248 (HB) (S.D.N.Y. 1999) [33].

¹³⁵ Ginsburg & Budiardjo, *supra* note 2, at 375.

¹³⁶ Ginsburg & Budiardjo, *supra* note 2, at 354.

equipment.¹³⁷ Despite the lack of a clear conception of the final image that would constitute the artistic work, the photographer's *intention* to capture images of the animals and the elaborate setup using the camera as an assistive tool are proof of the presence of a creative plan.¹³⁸ The animal triggering the remote capture of the image produces the final artistic work and *completes* the photographer's conception, thus recognising the photographer as the author. The US Copyright Office does not examine whether the presumed author of a photograph had an adequately precise pre-execution conception of the various possible resulting photographs. The Copyright Office states that the "author and initial copyright owner of a photograph is generally the person who 'shoots' or 'takes' the photo" and that copyrighting a photograph "protects the photographer's artistic choices, such as... the selection of camera lens, the placement of the camera, the angle of the image."¹³⁹ Likewise, courts are amenable to recognising photographers' authorship when photographers capture unforeseen events, despite the divergence between conceptions and results. For instance, when Abraham Zapruder "by sheer happenstance" captured President Kennedy's assassination in 1963 in his film, the court held that Zapruder was the film's author. This was notwithstanding the fact that Zapruder had intended to take "home movie pictures" of the presidential motorcade, but ended up creating a "historic document" of the fatal shot.¹⁴⁰ In a more controlled environment regarding copyright in a posed photograph, the US courts have evaluated what would constitute a product of the photographer's "intellectual invention",¹⁴¹ i.e. the "creative choices" that "the photographer made in composing the image—choices related to subject matter, pose, lighting, camera angle, depth of field, and the like."¹⁴²

In addition, the non-necessity of a complete conception is consistent with artists being recognised as authors despite the interference of unrestrained natural forces during the execution process. These scenarios, where artists intentionally relinquish some control over the execution process to random natural forces, are scenarios where the authors do not have a precise mental image of the resulting works. For instance, though Jackson Pollock's drip-and-splash painting process meant that he was unable to predict the exact direction and landing points of the paints

¹³⁷ See e.g., BBC Earth, *Filming the Impossible Sets: Filming burrows and tanks*, BBC, <http://www.bbc.com/earth/story/20160310-filming-the-impossible-sets-filming-burrows-and-tanks>.

¹³⁸ This is different from the situation of a photographer who lacked an intention to even take a photograph of animals in the first place, thus producing an authorless work. For instance, the photographer doing a fashion shoot with a model for *Vogue* in the Amazon Rainforest accidentally leaves a camera unattended, and a howler monkey picks up the camera to play with it, resulting in a photograph being taken.

¹³⁹ UNITED STATES COPYRIGHT OFFICE, CIRCULAR 42, COPYRIGHT REGISTRATION OF PHOTOGRAPHS (2018).

¹⁴⁰ *Time, Inc. v. Bernard Geis Assocs.*, 293 F. Supp. 130, 131 (S.D.N.Y. 1968).

¹⁴¹ See e.g., *Rentmeester v. Nike, Inc.*, 883 F.3d 1111, 1119 (9th Cir. 2018) (citing *Burrow-Giles Lithographic Co. v. Sarony*, 111 U.S. 53, 60 (1884)).

¹⁴² *Id.*

despite controlling the paintbrush, copyright law would most likely recognise Pollock's authorship status, notwithstanding his sometimes aleatory paintings.¹⁴³ The analytical focus of some scholars is on the elements of causation, intent, volition and proximity.¹⁴⁴ Taking it a step further, while Damien Hirst's spin paintings are less predictable, and involve controlling a machine since the canvas is attached to a spinning platform,¹⁴⁵ copyright law should similarly recognise Hirst's authorship because he executed his creative plan to create a spin painting, despite not knowing the precise outcome definitively.

In an AI-context, this would entail an inquiry as to whether there was a human individual or a team of individuals who had formulated a creative plan to bring about the final work. A number of different human actors can be involved in the formulation and execution of this plan. We envisage four possible outcomes: (1) the programmer is the sole author in the execution of the creative plan; (2) the user is the sole author; (3) the programmer and user are joint authors;¹⁴⁶ and (4) the work is authorless. The table below illustrates when each scenario arises:

Outcome	Did the programmer make an authorial contribution?	Did the user make an authorial contribution?
(1) Programmer as sole author	Yes	No
(2) User as sole author	No	Yes
(3) Programmer and user as joint authors	Yes	Yes
(4) Authorless work	No	No

The first and fourth outcomes can arise when the user's intervention or creative input is minimal. Whether the first or fourth outcome arises depends on the nature of the programmer's input. In the first outcome, the upstream programmer limits the downstream user's creative

¹⁴³ See San Diego Children's Discovery Museum, *Art Activity: Jackson Pollock Drip Art*, <https://www.sdcdm.org/blog/2020/04/art-activity-jackson-pollock-drip-art>. Jackson Pollock's drip painting process involved dripping and splashing paint on a large canvas.

¹⁴⁴ See, Dan L. Burk, *Thirty-Six Views of Copyright Authorship, By Jackson Pollock* 58 HOUS. L. REV. 263 (2020) (presenting a very detailed analysis of Pollock's copyright in his paintings).

¹⁴⁵ See *Damien Hirst*, <http://www.damienhirst.com/texts1/series/spins>. (Damien Hirst's spin paintings involved dripping paint on a canvas attached to a spinning platform).

¹⁴⁶ See *Nova Productions Ltd. v. Mazooma Games Ltd.* [2006] EWHC 24 (Ch) [105]-[106] (where a such a scenario occurred concerning a programmer and a player (i.e., the programme's user). The court analysed the programmer's and player's inputs in generating the composite frames, when determining the author).

control to relatively foreseeable choices, like starting the programme or setting a limited set of parameters that “do not amount to a protectable ‘expression’.”¹⁴⁷ Take for example, a video game where the player can “create” an avatar or character by making a number of choices within the game. The final graphical character created by the player is an “artistic work” capable of attracting copyright protection, but it does not mean that the player is the “author” of the work. The game programmer’s creative plan would have included the creation of *every* eventual character because there would have been a finite number of characters that can be created as a result of the programming code. In *Nova Productions*, the programmer’s creative plan was not interrupted by the downstream player’s creative influences, as the programmer “devised ... the rules and logic by which each frame [was] generated” thereby limiting the player’s inputs to predictable choices made when playing the game. Thus, the court held that the programmer was the author of the computer-generated works there.¹⁴⁸

The second and third outcomes can occur when the user makes an authorial contribution. The second outcome arises when the user satisfies the requisite creativity, and the programmer’s contribution is not apparent in the eventual work. In this case, the programme, which Ginsburg and Budiardjo liken to an “ordinary tool”,¹⁴⁹ relies *solely* on the user’s creative contributions: machines “designed to create outputs which reflect only the creative contributions of the users are ‘ordinary’ tools, and we should treat them in the same way we treat cameras, word processing programs, and other mechanical or digital adjuncts to the creative process.”¹⁵⁰ The user directs the AI system’s completion of its tasks and constructs the full conception that will establish the expressive elements of the eventual work. In doing so, he disrupts the programmer’s authorship claim over the final work. However, for the user to claim authorship over the work, he or she has to also satisfy authorship’s “execution” element by controlling how the programme creates the product. While the user is unable to influence the programme’s algorithm directly,¹⁵¹ he can perform acts of execution like defining the work’s compositional elements. Take for instance, a freely available algorithm that one may use to feed different input in order to generate a painting. Different users will achieve distinct paintings; the author of the algorithm will have copyright protection over *only* the computer program but not over paintings created as a result of users

¹⁴⁷ Ginsburg & Budiardjo, *supra* note 2, at 394.

¹⁴⁸ *Nova Productions*, [2006] EWHC 24 (Ch), [105]-[106]. *See also*, Gervais, *supra* note 40, at 2069 (Gervais explains that “the programmer of a videogame... authored the audio-visual output because... she created the code and files generating the image and sounds” and limited the user’s choices to the programmer’s prearranged choices).

¹⁴⁹ Ginsburg & Budiardjo, *supra* note 2, at 409.

¹⁵⁰ Ginsburg & Budiardjo, *supra* note 2, at 439.

¹⁵¹ The user is also not required to understand the algorithms and how the programme functions because that is irrelevant to the issue of whether the user satisfies the “execution” element.

feeding in different input. This conclusion is consistent with common logic. For example, the user of a picture created on Microsoft Paint is credited with the picture's execution, despite Microsoft Paint's developers being necessary for the painting's existence, because the painting's expressive features are directly attributed to the user. Thus, by employing the programme as a *tool* to produce the painting, the user is the sole author of the final painting. In contrast, the user's input in *Nova Productions* was held neither to be "artistic in nature" nor "skill or labour of an artistic kind", and was therefore insufficient to derail the programmer's authorship claim as the programme could not be considered the user's tool.¹⁵²

However, if the individual contributions cannot be separated from each other, then the third outcome of co-authorship can arise.¹⁵³ At the time of each individual's creative input, they must "be aware of and influenced by each other's specific contributions."¹⁵⁴ Suppose the user influences the creative process and expressive elements of the final work (i.e., the first outcome does not arise),¹⁵⁵ and his or her contributions are intertwined with the programmer's creative contributions. In that case, the programmer cannot be regarded as the sole author as the programmer's creative plan is unfinished without the user's creative inputs. As the programmer is unable to foresee how the user will use the program to complete the work, he cannot claim that his creative plan incorporates every possible finished work (like in the *Nova Productions* scenario). However, as the upstream programmer's choices still contribute to the creative plan by delineating the downstream user's role, the user does not disrupt the upstream programmer's authorship claim (i.e., the third outcome does not arise). Such a situation is likely to be witnessed within an organisation that has employed a team of individuals with discrete tasks to design the algorithm, select specific input, check data output and recalibrate further input etc. There would be a number of human co-authors but the copyright is likely owned by the employer organisation. As the Australian decision of *Telstra* has clearly demonstrated, it is critical to identify the human authors and show they have directed their contribution to the particular form of expression of the work in a collaborative or coordinated manner:

The evidence demonstrated time and again that many of the staff perform their function separately from and often oblivious to the function of others ... There is therefore a real

¹⁵² *Nova Productions*, [2006] EWHC 24 (Ch), [106] (as analysed by the court, examples of the player's inputs were spinning the rotary knob to pivot the cue around the cue ball and clicking the play button at a particular point to determine the shot's power).

¹⁵³ For example, this is contemplated by Singapore's Copyright Act. *See* Copyright Act 2021, s. 10 (defining "work of joint authorship" as work that "is produced by the collaboration of two or more authors; and the contributions of the authors are not separate").

¹⁵⁴ Ginsburg & Budiardjo, *supra* note 2, at 440.

¹⁵⁵ In terms of the proposed test, this means that the user satisfies the second stage of the proposed test.

question over whether there was the requisite level of collaboration between those workers to be considered joint authors.¹⁵⁶

The fourth outcome of authorless works generated by AI arises when the programmer is unable to predict the final work, even vaguely, and relinquishes control over the creative process to the AI system, which independently generates the work, i.e. an AI-authored work.¹⁵⁷ An authorless work can also arise when there are multiple contributors, such as multiple code contributors to a programme which subsequently produces the painting, but none of their contributions constitutes an authorial contribution sufficient for joint authorship, or the contributors did not collaborate; this is similar to the fact scenario in *Telstra* in respect of a compilation work where the Federal Court of Australia could not locate a human author(s) amongst the disparate group of human actors who had exerted any significant control or direction in a lengthy production process.¹⁵⁸ The court held that when determining originality, the focus must be “upon the origin of the work in some intellectual effort of the author”¹⁵⁹ and more importantly, there was no individual really in control of or coordinating the automated process of producing the directories there:

The compilation of the directories was overwhelmingly the work of the Genesis computer system or its predecessors. The selection of data and its arrangement in the form presented in each directory occurred only at “the book extract” or “book production” process. The compilations which emerged from the operation of the computer system do not originate from an individual or group of individuals. Indeed, *none of the individuals who contributed to the production of the directories had any conception of the actual form in which they were finally expressed*.¹⁶⁰

In the UK, the Court of Appeal’s interpretation of s. 9(3) of the CDPA in *Nova Productions* similarly supports such an outcome.¹⁶¹ As a result, these authorless works – despite the investment of skill, labour and money – would nonetheless belong to the public domain.

¹⁵⁶ *Telstra Corporation Ltd. & Another v. Phone Directories Company Pty. Ltd. & Others* [2010] FCAFC 149 at [33] (citing *Telstra Corporation Ltd v. Phone Directories Co Pty Ltd* [2010] FCA 44 at [337]). *See also, Telstra*, [2010] FCAFC 149, [92] (“Moreover, the work of these individuals was not collaborative. It was, no doubt, organised to facilitate the production of the directories but this organisation was not collaboration of the kind contemplated by the definition of joint authorship, and the contribution of each of the groups of individuals referred to earlier was made quite separately”).

¹⁵⁷ LAW REFORM COMMITTEE, SINGAPORE ACADEMY OF LAW, *supra* note 108, at [2.72], [2.76].

¹⁵⁸ Sam Ricketson, *Reflections on Authorship and the Meaning of a ‘Work’ in Australian and Singapore Copyright Law*, 24 SING. ACAD. L. J. 792, 822-823, 826-827 (2012) (discussing “authorial contribution” and the collaboration requirement as requirements for joint authorship under s. 10 of the Copyright Act 2021.) *See also, Telstra*, [2010] FCAFC 149, [91] (for an application of the collaboration requirement for joint authorship).

¹⁵⁹ *Telstra*, [2010] FCAFC 149, [58].

¹⁶⁰ *Telstra*, [2010] FCAFC 149, [89].

¹⁶¹ *Nova Productions*, [2006] EWHC 24 (Ch), [106] (the court held that the player’s contribution did not amount to an authorial contribution under s. 9(3) of the CDPA as he did not undertake any arrangements necessary for the creation of the computer-generated artistic work).

B. Is the requisite creativity satisfied?

This hurdle should be easily cleared. To determine whether the creative plan satisfies the “extremely low” level of creativity,¹⁶² the extent of human input is assessed holistically to determine whether the human did indeed direct the machine to produce the particular work.¹⁶³ It is perhaps in the most exceptional circumstances akin to the generation “garden-variety”¹⁶⁴ compilation works that an AI-aided work would fail this criterion.

While much of the hype today surrounds the creation of paintings, music and literary works by AI, computer programs have been used in the production of compilation works for decades. The US Second Circuit Court of Appeals held that:

The creative spark is missing where: (i) industry conventions or other external factors so dictate selection that any person composing a compilation of the type at issue would necessarily select the same categories of information, or (ii) the author made obvious, garden-variety, or routine selections.¹⁶⁵

When it comes to the selection or arrangement of information, “creativity inheres in making non-obvious choices from among more than a few options.”¹⁶⁶

The creation process for an AI-aided work is often lengthy and complicated. For convenience, we can view the production process as comprising three steps, as each step has a different type of human-machine collaboration: (1) preparation step, (2) creation step, and (3) review step.¹⁶⁷

The preparation step examines whether the programmer “feeds” the computer with input data and *instructs* it to examine that data. For instance, in a *Next Rembrandt*-type scenario, this can include selecting a range of paintings and classifying them, such as by painting style or painter. However, the programmer must select and classify based on criteria established by him exercising

¹⁶² *Asia Pacific Publishing*, [2011] 4 SLR 381, [38]. *See also*, Gervais, *supra* note 40, at 2105 (Gervais clarifies that the human and AI contributions need not be even, but that the human contribution must be more than “de minimis.”)

¹⁶³ LAW REFORM COMMITTEE, SINGAPORE ACADEMY OF LAW, *supra* note 108, at [2.75].

¹⁶⁴ *Feist Publications*, 499 U.S. 340, 362 (1991) (“The end product is a garden-variety white pages directory, devoid of even the slightest trace of creativity.”).

¹⁶⁵ *Matthew Bender & Co. v. West Publishing Co.*, 158 F.3d 674, 682 (2d Cir. 1998). *See also*, *Victor Lalli Enters., Inc. v. Big Red Apple, Inc.*, 936 F.2d 671, 673 (2d Cir.1991); *Bell South Advertising & Publishing Corp. v. Donnelley Info. Publishing, Inc.*, 999 F.2d 1436, 1444 (11th Cir. 1993).

¹⁶⁶ *Feist Publications*, 499 U.S. 340, 362 (1991).

¹⁶⁷ JONATHAN OSHA ET. AL., INTERNATIONAL ASSOCIATION FOR THE PROTECTION OF INTELLECTUAL PROPERTY (AIPPI), COPYRIGHT IN ARTIFICIALLY GENERATED WORKS: STUDY GUIDELINES 8-9 (2019) (suggesting a similar division of the production process). *See, Nova Productions*, [2006] EWHC 24 (Ch), [105] (where the EWHC implicitly supports this division when examining the programmer’s efforts).

his independent intellectual effort.¹⁶⁸ The court will likely deem selection and classification based on a standardised set of rules as a mechanical exercise lacking creativity.¹⁶⁹ In *Telstra*, Gordon J in the Federal Court of Australia held that copyright did not subsist in any of the directories, as the necessary human intervention focused on applying, to the telephone listings, rules that “were automated in the sense that they were programmed into the Genesis Computer System.”¹⁷⁰ In contrast, if a programmer expresses his creative freedom through “feeding” the AI system carefully curated paintings,¹⁷¹ and he does not base the curation on technical considerations,¹⁷² then he has strongly influenced the creation of the final AI-aided painting and satisfied the originality requirement.¹⁷³ The resulting work would be an intellectual creation reflecting the freedom of choice and personality of its author.

The creation step analyses whether the programmer directs the AI system, like via digital manipulation or using filters,¹⁷⁴ in a way that reflects the programmer’s personality and expresses the programmer’s own “free and creative choices”.¹⁷⁵

Finally, the review step scrutinises the human intervention, such as editing and polishing, in refining the raw computer output. However, this does not include editing according to technical considerations, like correcting AI-generated literature according to grammar rules.¹⁷⁶ In addition, if human intervention is limited solely to selecting what is perceived to be economically valuable paintings out of many paintings generated by the AI system, this ex post human intervention is insufficient to confer originality upon the works. This is because the creative process concludes when the painting is created.¹⁷⁷

¹⁶⁸ Spindler, *supra* note 66, at 1050.

¹⁶⁹ *Global Yellow Pages* [2017] 2 SLR 185, [14].

¹⁷⁰ *Telstra*, [2010] FCAFC 149 [91].

¹⁷¹ See e.g., *Is Artificial Intelligence Set to Become Art’s Next Medium?*, CHRISTIE’S (Dec. 12, 2018), <https://www.christies.com/features/a-collaboration-between-two-artists-one-human-one-a-machine-9332-1.aspx>. (the programmers for *Portrait of Edmond de Belamy* carefully selected 15,000 portraits painted between 14th century to the 20th century to “feed” the AI system).

¹⁷² *Bezpečnostní softwarová asociace – Svaz softwarové ochrany v. Ministerstvo kultury*, EU:C:2010:816, Case C-393/09 (Dec. 22, 2010) at 46-51 (“Bezpečnostní”) (the CJEU held that the graphic user interface (“GUI”) was considered the programmer’s own intellectual creation if the specific positioning of the GUI components were not determined solely by their technical functions, which would have overly limited the various possible positions, but determined in a way that enabled the author “to express his creativity in an original manner.”).

¹⁷³ Spindler, *supra* note 66, at 1050.

¹⁷⁴ Niloufer Selvadurai & Rita Matulionyte, *Reconsidering Creativity: Copyright Protection for Works Generated Using Artificial Intelligence*, 15 J. INTEL. PROP. LAW. & PRAC. 536, 539 (2020).

¹⁷⁵ *Infopaq Int’l*, Case C-5/08, [2010] FSR 20, [35]; Case C-145/10, *Eva-Maria Painer*, 2011 E.C.R. I-12533, [99].

¹⁷⁶ *Football Association Premier League Ltd and Others v. QC Leisure and Others*, EU:C:2011:631, Cases C-403/08 and C-429/08 (Oct. 4, 2011) [97]-[99].

¹⁷⁷ Ginsburg & Budiardjo, *supra* note 2, at 375.

V. APPLICATION OF THE PROPOSED FRAMEWORK TO *THE NEXT REMBRANDT*

This section applies the proposed evaluative framework to four scenarios – *The Next Rembrandt*¹⁷⁸ and three variations of it – each with different degrees of human input to illustrate how it may assist courts in analysing whether or not these works generated by computers would receive copyright protection.

The first scenario shows how *The Next Rembrandt*, without any variation, is a straightforward example of an AI-aided work. The painting satisfies the standard of conception, as the programmers executed their creative plan of producing a computer-generated painting based on Rembrandt's style. In terms of human intervention, during the preparatory step, the programmers fed the AI system with a particular selected data set.¹⁷⁹ Producing the data set included compiling and scanning all of Rembrandt's 346 paintings, and classifying over 400 faces in these paintings.¹⁸⁰ From the creation step to the review step, a unit of 20 data-analysts, developers, AI professors and 3D-printing experts transformed the computer-generated 2D image into a 3D-printed painting, and subsequently refined this 3D-printed painting. Viewed holistically, *The Next Rembrandt* was shaped by continuous human creativity decisions made at various steps in a systematic and coordinated fashion (unlike the disparate human action in *Telstra*), and is therefore considered a human-authored AI-aided work.¹⁸¹ In addition, *The Next Rembrandt* is most probably a work of joint authorship. There was constant interaction between the team of data-analysts, developers, AI professors and 3D-printing experts, and each of their individual contributions was inseparable from the rest. Given that the team worked on this painting for 18 months, depending on who had played key roles in assigning, coordinating and supervising the execution of the tasks, it is likely that we can identify a number of co-authors of the AI-aided painting (although copyright ownership would likely vest with the organisation under employment agreements).

In the second scenario, we assume that human input is limited only to the preparatory step, i.e., compiling and scanning all of Rembrandt's paintings, and classifying the faces in these paintings. The algorithm is programmed to run, analysing these paintings and faces, and ultimately

¹⁷⁸ *The Next Rembrandt*, MICROSOFT (Apr. 13, 2016), <https://news.microsoft.com/europe/features/next-rembrandt>; Dutch Digital Design, *The Next Rembrandt: Bringing the Old Master back to life*, MEDIUM (Jan. 24, 2018), <https://medium.com/@DutchDigital/the-next-rembrandt-bringing-the-old-master-back-to-life-35dfb1653597>.

¹⁷⁹ White & Matulionyte, *supra* note 40, at 243 (White and Matulionyte cites the *Portrait of Edmond de Belamy* as an example that such creative idea and effort at the preparation step is sufficient human intervention for copyright to subsist in the computer-generated work).

¹⁸⁰ DUTCH DIGITAL DESIGN, *supra* note 5.

¹⁸¹ Benita Lau, *How copyright applies to AI-generated works*, TECH IN ASIA (Dec. 13, 2017), <https://www.techinasia.com/talk/copyright-apply-ai> (Greg Borenstein's "algorithmic comics" is another example of a computer-generated artistic work, which Benita Lau argues qualifies for copyright protection, as Borenstein determined the parameters of what the programme searched for and constantly chose keywords).

generating a crude 2D version of *The Next Rembrandt* in accordance to the creative plan designed by the programmers. Nevertheless, the resulting work still qualifies for copyright protection in light of the “extremely low” level of creativity that courts require;¹⁸² most courts would agree with the observation of the US Supreme Court in *Feist* that “[t]he vast majority of works make the grade quite easily, as they possess some creative spark, no matter how crude, humble or obvious it might be.”¹⁸³

In the third scenario, the programmer “feeds” the AI system a variety of different LDMA works, and knows that the AI system will eventually produce an LDMA work, but does not know the type of LDMA work that will be generated. For instance, the AI system is given the complete literary works of William Shakespeare, the musical compositions of Mozart, the paintings of Rembrandt, the sculptures of Michelangelo and the photographs of Man Ray. The AI then generates a painting; it is not in the style of Rembrandt but is an artistic work that is the result of the cacophony of LDMA works that had been fed to the AI system. While the human-output causative link here is weaker than the previous two scenarios, but based on the second scenario, if the programmer exercises creativity in preparing the data set to “feed” the AI system, then there is sufficient human input. However, the vital issue that arises is whether the programmer satisfies the standard of conception. Although the programmer is only required to formulate a creative plan and execute it, the programmer in the third scenario can be said to lack a sufficiently defined creative plan since he does not have even a vague conception of the final output. Comparing with the notion of “accidental authorship” and incorporation of natural forces which could justify a low standard of conception – for instance, when setting up a motion-capture camera to photograph animals in the wild – the author in these situations minimally knows the type of LDMA work that will be produced.¹⁸⁴ In contrast, the programmers in this third scenario do not even know the type of LDMA work that will be produced, thus failing the standard of conception even though they have exercised free and creative choices in the input of data.

Autonomous AI systems are already being used in certain industries. For instance, autonomous artificial intelligence has been defined as “routines designed to allow robots, cars, planes and other devices to execute extended sequences of manoeuvres without guidance from humans”¹⁸⁵ or “systems that are able to accomplish a task, achieve a goal, or interact with its

¹⁸² *Asia Pacific Publishing*, [2011] 4 SLR 381, [38].

¹⁸³ *Feist Publications*, 499 U.S. 340, 345 (1991).

¹⁸⁴ The nature or animal photographer would know that the work produced would be a photograph; the photographer just does not know when precisely this work would be produced and what image would be fixed. Regarding incorporation of natural forces, both Pollock and Hirst knew that the final outputs were paintings.

¹⁸⁵ Peter Wayner, *What is Autonomous AI? A guide for enterprises*, VENTURE BEAT (Mar. 31, 2022), <https://venturebeat.com/2022/03/31/what-is-autonomous-ai/>.

surroundings with minimal to no human involvement.”¹⁸⁶ However, for the purposes of copyright law, our fourth scenario imagines a number of futuristic autonomous AI systems, such as one capable of producing a “push button” output¹⁸⁷ or one that contemplates a complex number of data sets and then decides to spontaneously create a work much like J.A.R.V.I.S. in the Marvel Cinematic Universe.¹⁸⁸ The works created are truly independent and autonomous AI-generated works. In the “push button” situation, besides pressing a button, the programmer does not shape or produce a specific image. Sorab Ghaswalla describes it as follows: “The logic being applied here is that an AI tool eventually ‘figures out’ for itself how to proceed and thus, creates its own design/content, etc without any human intervention at all. Push a button and the ‘output’ comes out.”¹⁸⁹ Unlike the third scenario, the programmer here does not even know if and when a work would be created. Under such circumstances, even assuming that the programmer fulfils the standard of conception, the negligible human input throughout the creation process means that the programmer failed to execute his creative plan. The human individual would also fail to satisfy even the “extremely low” level of creativity that courts require.¹⁹⁰ Thus, the resulting work will be considered an autonomous AI-authored work and unlikely to attract copyright protection under current laws.

VI. CONCLUSIONS

Copyright is not about a matter of beauty or taste;¹⁹¹ it is about encouraging and rewarding human creativity. Throughout history, humans have always relied on tools to produce paintings and other LDMA works. The oldest paintings were created with pigments. In the 1500s, paintings, like Leonardo da Vinci’s *Mona Lisa*, were created with paintbrushes. In the 1960s, Andy Warhol used mesh screens to transfer ink onto the canvas. In the 1990s, Damien Hirst created his spin paintings by pouring different coloured paint onto machine-operated rapidly rotating canvases. More recently, David Hockney’s series of 116 works, *The Arrival of Spring*, was “painted” on the

¹⁸⁶ Kathleen Walch, *The Autonomous Systems Pattern of AI*, FORBES (May 30, 2020), <https://www.forbes.com/sites/cognitiveworld/2020/05/30/the-autonomous-systems-pattern-of-ai/?sh=123890706a6b>.

¹⁸⁷ Sorab Ghaswalla, *Who Owns The Copyright Of AI-generated Content?*, MEDIUM (Jan. 18 2020), <https://medium.com/@sorabg/who-owns-the-copyright-of-ai-generated-content-edbe7cb8d480>. (Sorab Ghaswalla coins this term to describe an AI system that can churn an output with the simple push of a button.)

¹⁸⁸ See, J.A.R.V.I.S., MARVEL CINEMATIC UNIVERSE WIKI, <https://marvelcinematicuniverse.fandom.com/wiki/J.A.R.V.I.S.> (J.A.R.V.I.S. stands for Just A Rather Very Intelligent System).

¹⁸⁹ Ghaswalla, *supra* note 187; See also, Ricketson, *supra* note 158, at 820 (Ricketson distinguishes between AI-generated and AI-aided works by whether the programmer works with the programme to shape and produce the specific image, or whether the programme wholly produced the work).

¹⁹⁰ *Asia Pacific Publishing*, [2011] 4 SLR 381 [40].

¹⁹¹ Marianne Levin, *The Cofemel Revolution – Originality, Equality and Neutrality* in ROUTLEDGE HANDBOOK OF EU COPYRIGHT LAW 82, 89 (Eleonora Rosati ed., 2021).

iPad and then printed onto paper, with Hockney overseeing all aspects of production. In 2019, Scott Eaton in his debut exhibition, *Artist+AI: Figures & Form in the Age of Intelligent Machines*, in London, declared that he has trained AI to be his amanuensis, and that his interest in this emerging field of AI is “not in creating agents that ‘create art’ autonomously, but rather in making art ‘assistants’, AI collaborators that take direction and enhance the creative possibilities available to the human artist.”¹⁹² In an interview, Eaton triumphantly asserts the primacy of the human author: “The AI has no choice but to do what I ask, no matter how difficult or unreasonable my request. The result is often a wondrous, unexpected, interplay of visual ideas, both mine and the machine’s.”¹⁹³

While humans had been aided by the use of a kaleidoscope of tools in creating works of art, AI’s seemingly infinite potential continuously recharacterises the role of humans in this creative process. All is not lost when AI independently and autonomously generates works; the human artist – albeit not the “author” – credited with this innovation will nonetheless enjoy important recognition, and can exploit other forms of commercial opportunities associated with such AI works. Mario Klingemann’s “creation” of *Memories of Passersby I* is a paradigmatic example; his artworks have been exhibited at MoMA New York, the Metropolitan Museum of Art New York, and Centre Pompidou Paris.¹⁹⁴ To develop *Memories*, Klingemann trained his AI model by employing thousands of portraits from the 17th to 19th centuries. The flow of images presented in *Memories* does not follow a predetermined choreographic sequence but is the result of the AI autonomously interpreting its own output; the complex nature of this feedback loop means that no image will ever be repeated. *Memories* contain all the algorithms and GANs necessary to produce an endless succession of new images as long as it is running; in essence, the audience watches an AI brain “think” in real time and view unique portraits which are neither recorded nor repeated.

This paper had argued that the human authorship requirement is deeply ingrained in copyright subsistence and should not be abandoned even in the face of technological developments. Similar conclusions have been reached by a majority of scholars and policymakers. In a recent comprehensive examination of whether justifications of IP are applicable to AI from the perspective of copyright, Mauritz Kop concludes that “human authorship remains the normative organ point of intellectual property law and that (for now) smart robots do not have—

¹⁹² Eaton, *supra* note 9.

¹⁹³ Eaton, *supra* note 9.

¹⁹⁴ Art Dip, *Mario Klingemann MEMORIES OF PASSERSBY I*, MEDIUM (July 15, 2019), <https://medium.com/dipchain/mario-klingemann-memories-of-passersby-i-c73f72675743>.

and ought not have—legal personhood.”¹⁹⁵ Daryl Lim succinctly captures the essence of the debate regarding AI works. Lim observes:

No AI is itself the wellspring of creativity. Rather, the creativity the AI displays flows either from the algorithm used to design and train it, or from the instructions provided by the users operating it. Unlike human beings, algorithms do not have the quintessential lynchpin upon which to hang creativity – free will.¹⁹⁶

Our proposed framework recognises the roles of the programmer of the algorithm, the data supplier who selects and inputs the relevant data, and the users of the AI system who may add a further creative contribution to the final output. It is also able to allow the court to systematically evaluate the relative weight and nexus of creative input of each human individual to the final work to properly discern whether sole or joint authorship ought to be recognised. The European Parliament’s 2016 draft report acknowledged that there are no legal provisions specifically for robotics but highlighted the need to establish a criteria for copyrightable computer-generated works.¹⁹⁷ In April 2020, the draft report issued by the European Parliament pushed for copyrighting computer-generated works.¹⁹⁸ The UK has just concluded its public consultation for AI and IP in relation to copyright and patents.¹⁹⁹ We very much welcome the advent of unexpected and unusual AI art, but there is unfortunately no room for the AI author.

¹⁹⁵ Kop, *supra* note 13, at 338.

¹⁹⁶ Lim, *supra* note 89, at 842.

¹⁹⁷ EUROPEAN PARLIAMENT, COMMITTEE ON LEGAL AFFAIRS, DRAFT REPORT WITH RECOMMENDATIONS TO THE COMMISSION ON CIVIL LAW RULES ON ROBOTICS (2015/2103(INL)) (May 31, 2016) at 10.

¹⁹⁸ STÉPHANE SÉJOURNÉ, EUROPEAN PARLIAMENT, COMMITTEE ON LEGAL AFFAIRS, DRAFT REPORT ON INTELLECTUAL PROPERTY RIGHTS FOR THE DEVELOPMENT OF ARTIFICIAL INTELLIGENCE TECHNOLOGIES (2020/2015 INI), (Apr. 24, 2020) [10]. (“considers that certain works generated by AI can be regarded as equivalent to intellectual works and could therefore be protected by copyright”).

¹⁹⁹ *Artificial Intelligence and IP: copyright and patents*, <https://www.gov.uk/government/consultations/artificialintelligence-and-ip-copyright-and-patents>. (The consultation commenced on 29th October, 2021 and ended on 7th January, 2022. One of the specific questions posed is: “Copyright protection for computer-generated works without a human author. These are currently protected in the UK for 50 years. But should they be protected at all and if so, how should they be protected?”. See also Martin Kretschmer, Bartolomeo Meletti & Luis H. Porangaba, *Artificial Intelligence and intellectual property: copyright and patents – a response by the CREATE Centre to the UK Intellectual Property Office’s open consultation*, 17 J. INTELL. PROP. LAW. & PRAC. 321 at 323 (2022) (commenting that there is “no real need for a dedicated, *sui generis* provision dealing with copyright subsistence in computer-generated works”).