Struggling for creativity and the beauty of human error – copyright authorship meets generative AI and neuroscience

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Abstract

This paper explores the fundamental role of human struggle in the context of copyright-protectable works and sophisticated generative AI (genAI) technologies. While AI tools offer creators unprecedented assistance in eliminating mistakes and perfecting outputs, this paper argues that imperfection, frustration, and emotional complexity are central to the human creative process and over time could become the hallmark for authorship under copyright law.

Drawing from interdisciplinary insights and applying Jane C. Ginsburg's benchmarks for originality (detailed conception and controlled execution) the paper demonstrates that genAI content fails to meet the threshold for authorship, primarily due to the absence of the controlled execution integral to human creativity. The paper then turns to the human nervous system in order to justify that such outcome is in fact normatively sound and does not require any legislative amendment. It brings evidence to this populated academic debate from the discipline of neuroscience.

Overall, the paper contends that copyright law should prioritise process over product, recognising creativity as deeply human, error-prone, and emotionally driven, in stark contrast to the sterile machine output.

I. Introduction

"I have asked myself many times: if literature and art are a reflection of life, then to what extent is life a reflection of literature and life? And indeed, if life does reflect them, then what happens to that life, if we were to subject it to an assassination with an unstoppable attack of repetitive dead figures and words?"

Georgi Markov, Broadcasts on Radio Free Europe, 1975-1978.[1]

Human error is a valuable trigger for creativity.[2] Regardless of that, different instruments have continuously aided creators in avoiding glitches and correcting mistakes in the creative processes. These tools have helped polish, produce faster, more efficiently and effectively. In our creative processes, we have sometimes strived for perfection, an immaculate expression

[1] Translation by the author. For more about who Georgi Markov was, see <https://www.theguardian.com/world/from-the-archive-blog/2020/sep/09/georgi-markov-killed-poisoned-umbrella-london-1978> accessed 19 Septmeber 2025.

[2] The notion of 'error' in copyright law has mostly been discussed in the context of content moderation. This paper understands 'error' differently. For a discussion on the content moderation debate see João Pedro Quintais and others, 'Copyright Content Moderation in the European Union: State of the Art, Ways Forward and Policy Recommendations' (2024) 55 IIC 157.

without a single out of tune melody, perfect straight lines and impeccable contrasts. Arguably though, other times the human expression of creativity has been reflected in those imperfections driven by authorial choices. To that end, it is often the copy with errors that enters the collectors' editions and sells for extortionate amounts. Nowadays, with the various AI tools at hand, many human errors can be foreseen and prevented. This may lead to output, indistinguishable from human creations. Nonetheless, since generative AI (genAI) output tends to reflect the content it has been fed with, this continuous process of training and generating works could risk not only being biased,[3] but also rather stifled, perfect-looking, computerised, "repetitive dead figures and words".[4] GenAI saves one the process of creative struggle, the frustration of the writers' block and the pain of organising ideas, emotions and feelings into a creative outlet. It tends to just take several clicks.

In light of this, this paper takes the view that over the coming decades what will matter more for society in terms of creativity is not that the creators can get everything right, but instead that creators get certain things wrong. In copyright terms, this is not a plea to return to the old UK test for copyright originality – the "skill, effort, labour and judgment".[5] Instead, the article argues that it is the creative human process which is often fraught with errors and struggle that matters more, than the final product. The value of human error will become even more significant and can trigger the type of human expression that cannot be computed. To this end, it is worth diving into what makes us human. Artificial neural networks seek to mirror human neural networks. Nonetheless, there are certain aspects of the human nervous system that cannot be coded and automated, namely the emotion, frustration, pleasure, pain, joy and sometimes even pure struggle that is worth looking into. Copyright authorship is *human* driven and is not solely determined by curiosity and hunt for perfection and betterment, but also by the errors we make and the reflections thereof. These considerations sometimes derive from external interactions when communicating with others, presenting and relating to the world. Other times, they are internal; reflected in the human nervous system structures responsible for emotion, biological response and the link between the two. In this biopsychological organisation, our "internal cognitive architecture"[6] is unequivocally rooted in our bodies and minds, that is reflected in creative process and thus leads to a copyright protected work. This is the focus of this work.

Several disclaimers are necessary. First, the broad research on this topic has two dimensions – external and internal. On the former, academic literature has underlined in numerous iterations that authorship is no longer solitary and individualistic, but bears a collective touch[7] and as such is driven by the notion of communication.[8] This external frontier will be explored in other

[3] Martin Kretschmer, Thomas Margoni and Pinar Oruç, 'Copyright Law and the Lifecycle of Machine Learning Models' (2024) 55 IIC - International Review of Intellectual Property and Competition Law 110, 120; Amanda Levendowski, 'How Copyright Law Can Fix Artificial Intelligence's Implicit Bias Problem' (2018) 93 Washington Law Review 579.
[4] Markov (n 1).
[5] *Ladbroke* v *William Hill* [1964] 1 WLR 273.
[6] Erez Reuveni, 'Copyright, Neuroscience and Creativity' (2013) 64 Alabama Law Review 735, 746.

[7] Daniela Simone, *Copyright and Collective Authorship: Locating the Authors of Collaborative Work* (Cambridge University Press 2019); Martha Woodmansee, 'On the Author Effect: Recovering Collectivity' in Martha Woodmansee and Peter Jaszi (eds), *The Construction of Authorship: Textual Appropriation in Law and Literature* (Duke University Press 1994).
[8] Carys J Craig, *Copyright, Communication and Culture: Towards a Relational Theory of Copyright Law* (Edward Elgar Publishing 2011); Abraham Drassinower, 'From Distribution to Dialogue: Remarks on the Concept of Balance in Copyright Law' (2009) 34 The Journal of Corporation Law 991; Lior Zemer, 'Dialogical Transactions' (2016) 45 Oregon Law Review 141.

publications, while the focus of this article remains internal, namely the intersection between copyright law and neuroscience.[9] This paper by no means attempts to unpack all the intricate complexities of the human nervous system. Instead, it uses the neuroscience lens to build a respective understanding of copyright law authorship and buttress the argument against copyright protection of "purely" genAI output.

Second, there is no specific jurisdictional focus – the neuroscience does not know geographical borders; or as Reuveni puts it "the neurobiology of creativity remains constant – its functions and structure remain the same, regardless of what policies and assumptions we layer on top of it".[10] On the IP front, there are certain cross-jurisdictional differences in the assessment of the copyright law originality test, the main threshold to pass for a work to be protected. Nonetheless, building on the comparative literature on the topic and the prominent work of Jane C. Ginsburg, the argument is hereby made that the originality test globally universally entails two specific benchmarks – detailed conception and controlled execution ('the Ginsburg benchmarks').[11] This framework will be applied to the debate of copyright authorship through the lens of neuroscience.

There has been a constant and continued need to engage with this topic considering the broad societal concerns of genAI and the disruption to human creative works. Section II to paints the background to this debate explaining the reasons why this is still a vibrant topic despite the ever-growing hype on surrounding AI. Section III looks at copyright authorship and originality as applied to genAI. The Ginsburg benchmarks are instrumentalised to demonstrate that while meeting the detailed conception limb of the analysis may be possible by virtue of designing careful prompts, the controlled execution branch hits serious barriers in the context of genAI. Therefore, the output of genAI processes, lacking controlled execution does not gain copyright protection. The next section turns to the human nervous system to justify that such an outcome is in fact normatively sound and does not require any legislative amendment. It brings evidence to this populated academic debate from the discipline of neuroscience. The human nervous system – the interconnectivity of the peripheral and the central nervous systems – bear peculiar uniquely human features. More precisely, the various structures within the limbic system make the human biopsychology and in particular the study of human emotion unique to our kind. The emotional reaction and mental effects in the brain of the creator and in that of the audience have no parallel in AI systems. It is often the errors, struggle, frustration and persistence of the human biopsychology that leads to creative processes. Finally, Section V turns to the counterarguments that AI systems nowadays could be equated to human creative processes. The paper concludes in Section VI that the net of authorship claims is uniquely human (and rightly so). Looking inside the human nervous system confirms this understanding and to that end encouraging human creative *processes* should remain central.

[9] Also, called psychobiology, biopsychology or biological psychology. The terms are used by literature interchangeably, but for the sake of coherence the paper adopts mostly the term neuroscience.

[10] Reuveni (n 6) 745.

[11] Jane C Ginsburg, 'The Concept of Authorship in Comparative Law' (2003) 52 DePaul Law Review 1063.

II. Context and background – why is this still a vibrant topic?

In the discussion on copyright law and AI, one of the two primary concerns has been whether outputs generated by and/or with the assistance of AI meet the criteria for copyright protection, and if so, how and to whom authorship should be attributed.[12] This has been a vibrant topic for several years now and the academic literature is vast, interdisciplinary, comparative and often provocative.[13] With the rapid advancement of genAI and LLMs, most prominently after the rise of OpenAI's GPT-2 and GPT-3, these issues have intensified, further complicating existing legal and conceptual frameworks.

For a while it was still possible to argue that the technology is a pure tool and thus following what Daniel Gervais refers to as a "binary paradigm" in the analysis of copyright authorship – either the AI is a mere tool for a human user, which leads to the outcome that the AI user is the author of any copyrightable subject matter generated, or the AI only generates content that it had been *ex ante* programmed to do.[14] In the latter case, the copyright author of the output is the programmer, provided that the work meets the protectability requirements (typically, this is the so-called originality standard to which the next section turns). However, generative models and in particular the involvement of prompts has led to a much more complicated scenario where this binary paradigm no longer operates convincingly. Therefore, copyright authorship and originality have re-emerged as IP issues.

What is more, the debate is no longer just academic. Law and policy makers, as well as courts are all struggling.[15] Driven by the activities of the US Copyright Office (USCO), the federal body responsible for copyright registrations, the US has been at the forefront of these issues. While copyright registration is not required for the exitance and enjoyment of copyright as per the Berne Convention,[16] the US operates a system whereby registration is a requisite for enforcement. To that end, the USCO regularly deals with applications in which AI was used in one form or another.[17] Faced with this challenge, the USCO launched several initiatives seeking to shed light on the topic, structure current practice and provide guidance. These included a public consultation, listening sessions with concerned stakeholders, as well as a registration

[12] The other concern is that of the input issues and text and data mining. See more at Séverine Dusollier and others, 'Copyright and Generative AI: Opinion of the European Copyright Society' (2025) <https://europeancopyrightsociety.org/wp-content/uploads/2025/02/ecs_opinion_genai_january2025.pdf> accessed 24 February 2025.

[13] See the following among many others Ana Ramalho, *Intellectual Property Protection for AI-Generated Creations Europe, United States, Australia and Japan* (Routledge 2022); P Bernt Hugenholtz and João Pedro Quintais, 'Copyright and Artificial Creation: Does EU Copyright Law Protect AI-Assisted Output?' (2021) 52 IIC 1190; Aviv Gaon, *The Future of Copyright in the Age of Artificial Intelligence* (Edward Elgar Publishing Limited 2021); Bernt Hugenholtz and others, 'Trends and Developments in Artificial Intelligence - Challenges to the Intellectual Property Framework' (European Commission 2020); Martin Senftleben and Laurens Buijtelaar, 'Robot Creativity: An Incentive-Based Neighboring Rights Approach' (2020) 42 EIPR 797; Daniel Gervais, 'The Machine As Author' (2020) 105 Iowa Law Review 2053; Jane C Ginsburg and Luke Ali Budiardjo, 'Authors and Machines' (2019) 34 Berkeley Technology Law Journal 343; Ana Ramalho, 'Originality Redux: An Analysis of the Originality Requirement in AI-Generated Works' (2018) 1 AIDA 23; Ana Ramalho, 'Will Robots Rule the (Artistic) World? A Proposed Model for the Legal Status of Creations by Artificial Intelligence Systems' (2017) 21 Journal of Internet Law 12.

[14] Gervais, 'The Machine As Author' (n 13) 2069.

[15] 'Generative AI – IP Cases and Policy Tracker | Mishcon de Reya' (*Mishcon de Reya LLP*) <https://www.mishcon.com/generative-ai-intellectual-property-cases-and-policy-tracker> accessed 11 June 2025.

[16] Berne Convention, art 5(2).

[17] See for example, 'Théâtre D'opéra Spatial' (US Copyright Office 2024) <https://www.copyright.gov/rulings-filings/review-board/docs/Theatre-Dopera-Spatial.pdf> accessed 19 August 2024; 'Zarya of the Dawn' (US Copyright Office 2023) <https://www.copyright.gov/docs/zarya-of-the-dawn.pdf> accessed 19 August 2024.

guidance and several reports.[18] One such important policy document is the 'Copyright Registration Guidance: Works Containing Material Generated by Artificial Intelligence' issued in March 2023, which describes the manner in which the Office applies copyright law's human authorship requirement to applications for registration where AI technologies have been used.[19] The guidance bears two important messages: first, human authorship is central, so the USCO will not register works conceived and executed by a machine; and second, applicants have a duty to disclose the inclusion of AI-generated content in a work submitted for registration and provide a brief explanation of the human author's contributions to the work – a sort of a transparency requirement.[20] Having received more than 10 000 responses in its public consultation,[21] in January 2025 the USCO's report on copyrightability concluded that copyright protects original expression created by a human author, even if the work also includes AI-generated material; furthermore, such protection does not extend to "purely AI-generated material, or material where there is insufficient human control over the expressive elements".[22] The USCO is not anti-AI in the sense that if there is sufficient human involvement in the creative process even though that process relied on an AI, then the work would still be subject to copyright protection. The key question then becomes what does sufficient human involvement mean?

At the same time, on the litigation front, the US Court of Appeals for the District of Columbia ruled on 18 March 2025 that the USCO was correct in denying registration to the infamous "A Recent Entrance to Paradise" generated by a genAI system called the "Creativity Machine" created by the equally infamous Dr. Thaler.[23] The court was clear - *human* authorship is a must.

The UK government has been equally overwhelmed with both the input and output issues on AI and copyright. It also consulted the public on the topic between 17 December 2024 and 25 February 2025.[24] The UKIPO received more than 11 000 responses – it has been pointed out that the only other consultation that received a higher number of responses in the UK has been the one on the ban of smoking. Most of the questions focused on the legalities surrounding the text and data analysis exception to copyright infringement, ie the 'input' issues. There were however eight questions on a peculiar provision in the UK copyright law – section 9(3) of the Copyright Designs and Patents Act 1988 (CDPA). The UK, together with Ireland,[25] are the only jurisdictions in the world that have a provision in their copyright laws on the protection of computer-generated works. The public consultation hints into the direction of repealing that provision. The reasons for this lie beyond the scope of this paper but focus on the lack of clarity,

[18] 'Copyright and Artificial Intelligence | U.S. Copyright Office' (*USCO*) <https://www.copyright.gov/ai/> accessed 20 August 2024.
[19] US Copyright Office, 'Copyright Registration Guidance: Works Containing Material Generated by Artificial Intelligence' (2023) 16190 FEDERAL REGISTER, VOL. 88, NO. 51 2 <https://www.copyright.gov/ai/ai_policy_guidance.pdf> accessed 20 August 2024.
[20] ibid 3–4.
[21] 'Copyright and Artificial Intelligence | U.S. Copyright Office - Public Comments' (*USCO*) <https://www.regulations.gov/docket/COLC-2023-0006/comments> accessed 17 July 2025.
[22] US Copyright Office, 'Copyright and Artificial Intelligence: Part 2: Copyrightability' (US Copyright Office 2025) iii <https://www.copyright.gov/ai/Copyright-and-Artificial-Intelligence-Part-2-Copyrightability-Report.pdf> accessed 12 June 2025.
[23] *Stephen Thaler v Shira Perlmutter (2025) 23-5233, (DC Cir)* (Court of Appeals for the DC Circuit).
[24] 'UKIPO Consultation - Copyright and Artificial Intelligence' (*GOV.UK*, 17 December 2025) <https://www.gov.uk/government/consultations/copyright-and-artificial-intelligence> accessed 17 July 2025.
[25] Copyright and Related Rights Act 2000, sec 2(1) (Ireland).

constitutional character and inappropriateness of the provision in light of the genAI technologies.[26]

Finally, the EU has wisely not moved on with any legislatively change on the AI-outputs front. Any such decision has to be carefully scrutinised under the EU constitutional law-making powers in the field of copyright law.[27] A 2025 report commissioned by the European Parliament and authored by Nicola Lucchi establishes that legal clarity is urgently needed. Very much in line with the position of the USCO, the report stipulates that fully machine-generated content should remain in the public domain, while criteria for protecting AI-assisted works should be codified in EU law.[28]

III. Struggling for creativity – originality and authorship through the lens of genAI

3.1. Originality and authorship

The topic of extending copyright protection to AI-generated output revolves around substantive and normative questions. In addressing the former, one needs to engage in an analysis of the copyright protectability standards, which tend to vary from country to country.[29] Nonetheless, some common pillars certainly exist, namely the necessity for a work to be an expression of an original intellectual creation (the notion of originality) of a human author (the notion of authorship).

Originality and authorship go hand in hand; they are the two sides of the same coin.[30] This is evident in the EU/UK approach: a work is protected by copyright if it is the "author's own intellectual creation".[31] This is the infamous originality standard which in itself entails the word 'author'. Despite some initial hesitation in case law, the UK has maintained the same approach to originality even post-Brexit and this was firmly confirmed in 2023 by Arnold LJ in the Court of Appeal in *THJ*.[32]

[26] James Parish, 'Time to Repeal Section 9(3) of the Copyright, Designs and Patents Act 1988: New Insights from the Lobbying and Drafting History behind the Infamous United Kingdom Computer-Generated Works Regime' (2025) 2 IPQ 94; Patrick Goold, 'The Curious Case of Computer-Generated Works under the Copyright, Designs and Patents Act 1988' (2021) 2 IPQ 120.
[27] Alina Trapova, 'Copyright for AI-Generated Works: A Task for the Internal Market?' (2023) 48 European Law Review 187.
[28] Nicola Lucchi, 'Generative AI and Copyright: Training, Creation, Regulation' (European Parliament 2025) PE 774.095 90–106.
[29] Although already slightly outdated, for a comprehensive analysis of the substantive framework in the EU and still applicable to the UK, see Hugenholtz and others (n 13).
[30] Simone (n 7) 20.
[31] Directive 2009/24/EC of the European Parliament and of the Council of 23 April 2009 on the legal protection of computer programs 2009 268, 1(3); Directive 1996/9/EC of the European Parliament and of the Council of 11 March 1996 on the legal protection of databases OJ L 77, art 3(1); Directive 2006/116/EC of the European Parliament and of the Council on the term of protection of copyright and certain related rights 2006 art 6; *Case C-5/08 Infopaq International A/S v Danske Dagblades Forening* [2009] [34].
[32] *THJ Systems Ltd & Anor v Sheridan & Anor* [2023] EWCA Civ 1354.

Many have studied the roots of 'authorship' – academics are unanimous that an anthropocentric view of it remains.[33] In the words of Paul Goldstein "copyright is about sustaining the conditions of creativity that enable an *individual* to craft out of thin air, and intense, devouring labor, an Appalachian Spring, a Sun Also Rises, a Citizen Kane" [emphasis added].[34] The literature has questioned the crafting out of "thin air" aspect, which has been tied to the idea of the "romantic author".[35] Responding to this, many have engaged with the debate on collective, derivative and dialogical creativity.[36] While this has led to diverging theories on copyright law, most scholars firmly maintain that a human being is and should remain central to any authorship and originality tests. That said, the legacy of the romantic author has not entirely evaporated. It is not dominant, but at least in some contexts, the image of the author as "an individual autonomous agent operating in relative isolation"[37] has persisted.[38] Such understanding of authorship inevitably charges the originality test in all jurisdictions.

In the EU, the CJEU (an approach followed also in the UK) has held that for the purposes of copyright law, a subject matter will be classified as a "work" provided that it satisfies two cumulative conditions: (i) it must be original in the sense that it is the "author's own intellectual creation" and (ii) only something which is an expression can be classified as an "author's own intellectual creation".[39] The former is the already mentioned classic 'originality standard'.[40] The CJEU has delivered many judgments on this topic and despite that it appears that the precise meaning of that standard is not clear.[41] The latter is tightly linked to the internationally acknowledged idea/expression dichotomy, codified in article 9(2) of the TRIPS Agreement. In addition, the *Levola Hengelo* case elaborated the protectability standards to further mean that "the subject matter protected by copyright must be expressed in a manner which makes it identifiable with sufficient precision and objectivity, even though that expression is not necessarily in permanent form."[42]

Naturally, the concrete parameters of the originality standard are blurred. The legal test to determine whether a work is the intellectual creation of a human author can never be a bright line rule. Nonetheless, following the jurisprudence of the CJEU certain guidance has emerged, as follows:

(i) an author needs to be able to express their "free and creative choices" and "stamp the work created with [their] personal touch";[43]

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[33] Sam Ricketson, 'The 1992 Horace S. Manges Lecture - People or Machines: The Berne Convention and the Changing Concept of Authorship' (1991) 16 Columbia-VLA Journal of Law & the Arts 1, 6; Adolf Dietz, 'The Concept of Authorship under the Berne Convention' (1993) 155 RIDA 3.
[34] Paul Goldstein, 'Copyright' (1991) 38 J. Copyright Soc'y U.S.A. 109, 110.
[35] Simone (n 7); Peter Jaszi, 'On the Author Effect: Contemporary Copyright and Collective Creativity' in Martha Woodmansee and Peter Jaszi (eds), *The Construction of Authorship: Textual Appropriation in Law and Literature* (Duke University Press 1994).
[36] See the following among many others Simone (n 7); Craig (n 8); Drassinower (n 8); Lior Zemer, *The Idea of Authorship in Copyright* (Ashgate Publishing 2007); Woodmansee (n 7); Jaszi (n 35).
[37] Mireille van Eechoud, 'Voices near and Far' in Mireille van Eechoud (ed), *The Work of Authorship* (Amsterdam University Press 2014) 11.
[38] Lionel Bently, 'Copyright and the Death of the Author in Literature and Law' (1994) 57 Modern Law Review 973, 977.
[39] *Case C-683/17 Cofemel – Sociedade de Vestuário SA v G-Star Raw CV* [2019] [29].
[40] *Infopaq* (n 31) [34].
[41] Some of the cases discussing this are *Case C-145/10 Eva-Maria Painer v Standard VerlagsGmbH and Others* [2011] CJEU ECLI:EU:C:2011:798; *Case C-393/09 Bezpečnostní softwarová asociace – Svaz softwarové ochrany v Ministerstvo kultury* [2010] CJEU ECLI:EU:C:2010:816; *Cofemel* (n 39); *Case C-833/18 SI and Brompton Bicycle Ltd v Chedech / Get2Ge* [2020]; Several others are still pending *Mio and Others* [Pending] CJEU C-580/23; *konektra* [Pending] CJEU C-795/23.
[42] *Case C-310/17 Levola Hengelo BV v Smilde Foods BV* [2018] [40].
[43] *Painer* (n 41) [92–94].

(ii) "significant labour and skill of its author… cannot as such justify the protection of it by copyright … if that labour and that skill do not express any originality";[44]

(iii) works "which are subject to rules of the game, leaving no room for creative freedom for the purposes of copyright" are not original;[45] to that end, if a work is dictated "solely" by technical considerations, rules or other constraints which leave no room for creative freedom, originality is absent;[46]

(iv) mere presence of technical considerations is not a barrier for originality, but an author must be able to reflect their personality in an expression of free and creative choices.[47]

No further criteria should exist for a copyright work to be classified as original.[48] In all these elaborations of the originality standard, what emerges is that the focus is not merely on the final output, but the considerations and choices that go into the creative pipeline. In May 2025, AG Szpunar in *MIO/konektra* tackled the relevance of the creative process and author's intentions when assessing the protectability of works of applied art.[49] At first sight, it may appear that the AG Opinion goes against the argument of this paper that the creative process is the more relevant aspect in the product/process dichotomy. The AG emphasises that the reflection of the author's personality in the shape of the subject matter is the fundamental condition for protection under EU copyright law arguing that "the use of the words 'reflects' and 'expression' clearly indicates that such choices and the author's personality must be visible in the subject matter for which protection is claimed. It is therefore not enough that the creator made free and creative choices: those must still be perceptible to third parties through the work itself."[50] Such perceptibility of an original work is indeed of high significance. It has been evidenced also in *Levola*'s condition of objectivity and the rule that copyright protects expressions and not mere ideas.[51] The AG Opinion however ties the discussion on the creative process to the intentions of the author when creating. In that light, it makes perfect sense – "since the author's intentions are not decisive, it would be superfluous to try to establish the author's state of mind during the creative process."[52] However, a conservative and rigid application of the AG's approach to the AI-generated works debate risks undermining the necessity of a human in the loop of the creative *process*. Therefore, as the AG states correctly "the possibility of making free choices,

[44] *Case C-604/10 Football Dataco Ltd and Others v Yahoo! UK Ltd and Others* [2012] CJEU ECLI:EU:C:2012:115 [42].
[45] *Cases C-403/08 and C-429/08 Football Association Premier League Ltd and Others v QC Leisure and Others and Karen Murphy v Media Protection Services Lt* [2011] [98].
[46] *Brompton Bicycle* (n 41) [24].
[47] ibid 26.
[48] For the first CJEU case discussing national legislation where further such criteria existed see *Cofemel* (n 39); Two more cases are currently pending in the CJEU on the topic, see *Mio and Others* (n 41); *konektra* (n 41).

[49] *Opinion of Advocate General Szpunar in Joined Cases C-580/23 and C-795/23 MIO/konektra* [2025] CJEU ECLI:EU:C:2025:330.

[50] ibid 45.

[51] *Levola Hengelo* (n 42).

[52] *Opinion of Advocate General Szpunar in Joined Cases C-580/23 and C-795/23 MIO/konektra* (n 49) [49].

at the time of creation, does not give rise to a presumption that those choices are creative."[53] Instead, it is actuality of a human being making those free and creative choices during the creative process that should be championed in the genAI output and copyright protectability debate.

An important consideration in this respect is the available room for creativity in that process, ie the creative constraints. The fact that an author is limited by certain creative constraints is not sufficient reason to deny that author copyright protection.[54] This is, though, a delicate point. Some constraints might be too rigid leaving the author none, or very limited, space for creativity. This has been the case traditionally for utilitarian objects, such as the Brompton bike.[55] Other constraints may actually stir creativity – as Stef van Gompel has argued, too much freedom may "paralyse" creativity as the creative space becomes too wide to control and make any creative choices.[56] It is connecting seemingly unconnected pieces in a creative manner that renders a work original. Sometimes obstacles in the way would push one to think outside the box and come up with the original combinations. While the discussion on constraints is common to functional and utilitarian works, such as those discussed above in *MIO/konektra*,[57] it is not limited just to such works. For instance, referring to literary works, Jon Elster considers creation as "choice of constraints followed by choice within constraints."[58] Similarly, the world-famous composer Igor Stravinsky sustains that "my freedom will be so much the greater and more meaningful the more narrowly I limit my field of action and the more I surround myself with obstacles".[59] Thus, authors often voluntarily impose constraints such as choice of genre or audience. Creators put themselves alone through the struggle of limitations in order for their creative output to emerge. Other times, the constraints are involuntary (writer's block, author's mood, etc) and do not depend on the author's will.[60] Some of these constraints are irrelevant from a copyright perspective since they do not restrict choice, but "limit the freedom of action" (deadlines, budget, etc).[61] Nonetheless, there is a link between the degree of freedom that the creator enjoys delineated by the constraints and the level of creativity evident in the works produced.[62] What matters is that following these sources of creative constraints, there still remains some room for creativity, ie "for authorship to flourish, authors must enjoy autonomy in their work".[63] Once again, that process within creative constraints is often fraught with struggle and errors that stimulate the author's own intellectual creation – it is the process that matters more, than the final product.

[53] ibid 62.

[54] Hugenholtz and others (n 13) 73.
[55] *Brompton Bicycle* (n 41).

[56] Stef van Gompel, 'Creativity, Autonomy and Personal Touch' in Mireille van Eechoud (ed), *The Work of Authorship* (Amsterdam University Press 2014) 107.
[57] *Opinion of Advocate General Szpunar in Joined Cases C-580/23 and C-795/23 MIO/konektra* (n 49).

[58] Jon Elster, *Ulysses Unbound: Studies in Rationality, Precommitment, and Constraints* (Cambridge University Press 2000) 176.
[59] Igor Stravinsky, *Poetics of Music in the Form of Six Lessons* (Harvard University Press 1970) 65.
[60] For a comprehensive overview of the different categories of internal, external, voluntary and involuntary constraints see van Gompel (n 56) 108.
[61] ibid 118–119.
[62] ibid 104.
[63] Goldstein (n 34) 110.

Against this background, academics have continuously engaged in comparative analysis of the parameters of the originality and authorship standards in different jurisdictions.[64] This paper bases the genAI analysis on Jane C. Ginsburg's valuable work on these notions, according to which for a work to be considered an original work of authorship meriting copyright protection, two specific cumulative elements need to be present: a detailed conception of a work and controlled execution of that same work.[65] The rationale adopting Ginsburg's standard in this research is twofold. First, it reflects a truly 'global' perspective since her comparative research on the topic is rooted in both common law and civil law jurisdictions. Second, such an understanding has stood the test of time – the author has scrutinised and vetted it not only from a historical perspective but has carefully traced its application on machine learning when the discussion intensified around 2019,[66] as well as against the most recent developments in the context of genAI and prompt engineering.[67] Therefore, these two elements stand as the most convincing benchmark of originality/authorship, which correspond to the EU, UK and US case law direction.

3.2.Detailed conception and controlled execution

Creativity is central to the originality test. It is also the part of the definition surrounded by most uncertainty. Rooted in Latin, it derives from the word *"creatus"*, the past participle of *"creatre"*, meaning *"to produce, to make"*. It is also related to the verb *"crescere"* in Italian, meaning *"to grow"*.[68] This is as far as researchers agree on the notion of creativity. One observation can be made at this point though – it is evident that a certain emphasis is placed on the process as opposed to the product. To produce, make or grow implies a certain change from state A to state B, a move and/or transformation. Thereafter, the term evolves depending on the context and the field it is used in.[69] Even within the individual fields, there is a strong disagreement about its meaning.[70] In this respect, in an attempt to decipher originality and authorship in copyright law some have sought inspiration from other fields such as aesthetics and creativity studies,[71] as well as philosophy and psychology.[72] Others trace the history of creativity from cave art to remixing and advocate for a reconciliation of all creative practices.[73] It has been stressed that in general the proposed definitions of creativity are either "too broad or too narrow to sufficiently enhance the understanding and guide the interests of creativity

[64] Daniel Gervais, 'Feist Goes Global: A Comparative Analysis of the Notion of Originality in Copyright Law' (2002) 49 Journal of the Copyright Society of the USA 949; Ginsburg (n 11).
[65] Ginsburg (n 11).
[66] Ginsburg and Budiardjo (n 13); Jane C Ginsburg, 'People Not Machines: Authorship and What It Means in the Berne Convention' (2018) 49 IIC 131.
[67] Shyamkrishna Balganesh, Jane C Ginsburg and Philippa S Loengard, 'Comments of the Kernochan Center for Law, Media and the Arts - Columbia Law School' (2023) Docket No. 2023-6.
[68] Panagiotis G Kampylis and Juri Valtanen, 'Redefining Creativity — Analyzing Definitions, Collocations, and Consequences' (2010) 44 The Journal of Creative Behavior 191, 191–192.
[69] Stef van Gompel and Erlend Lavik, 'On the Prospects of Raising the Originality Requirement in Copyright Law: Perspectives from the Humanities' (2013) 60 Journal of the Copyright Society of the USA 387, 404–405, underlining that 'different creations are original for different reasons' and that the creative process is 'myserious'.
[70] Howard B Parkhurst, 'Confusion, Lack of Consensus, and the Definition of Creativity as a Construct' (1999) 33 The Journal of Creative Behavior 1, 2–3, looking at behavioural studies.
[71] van Gompel (n 56) 101; van Gompel and Lavik (n 69).
[72] Ramalho, 'Originality Redux: An Analysis of the Originality Requirement in AI-Generated Works' (n 13).
[73] Giancarlo Frosio, *Reconciling Copyright With Cumulative Creativity: The Third Paradigm* (Edward Elgar Pub 2018).

researchers and concerns of practitioners".[74] Yet, Stef van Gompel correctly points out that creativity is part of the originality standard in copyright law[75] and it risks remaining a "hollow term" if it is not taken more seriously.[76]

Thus, in taking creativity, authorship and originality more seriously, Jane C. Ginsburg carries out a comprehensive comparative study of common law and civil law systems in an attempt to identify the meaning of the concept of authorship (and originality as related to it).[77] She concludes that the creative author is a human being exercising, on the one hand a subjective judgment in composing a piece – what she calls "a detailed conception", and on the other hand, controlled execution.[78] The essence of this two-fold assessment translates into the idea that the author is the one that conceptualises and directs the development of the work and not merely the one who follows orders to execute it.[79]

In a later piece on machine learning Jane C. Ginsburg and Ali Budiardjo exemplify the conception and execution standard in action with a very elegant reference to Antoine de Saint-Exupéry's masterpiece "The Little Prince".[80] The analogy goes as follows: The Little Prince says to the aviator "*Draw me a sheep!*". At this stage, the aviator calls to his mind the concept of a sheep, determines all its features such as size, shape, colour and eventually picks up the pen and draws it. The Little Prince only provides very general instructions, but the aviator is entirely responsible for all the creative choices that lead to the depiction of that particular sheep. Hence, The Little Prince has provided the aviator only with a general concept(ion), without controlling the execution. The aviator is responsible both for concretising this general idea by imagining the type of sheep to be drawn, but also for the proper controlled execution of the act of drawing. Both steps are required for someone to be considered an author and by virtue of that to reflect their original creative choices in a work. The degree of involvement between two authors could certainly vary with respect to each of the limbs.

The 'detailed conception' element from the Ginsburg standard of authorship is linked to the differentiation between concept and conception.[81] The distinction, very common in the field of philosophy,[82] refers to the different levels of abstractions.[83] The concept remains at this broad level of abstraction. Generally, there is a common understanding on what a concept is about, ie what is a sheep. However, when it comes to the detailed conception, there can be a million manners of depicting a sheep. Such differentiation is tied to the idea/expression dichotomy, according to which ideas roam free and copyright law protects solely the original expression of such ideas. The concept (or, its abstract conception) of a sheep drawing cannot be subject to copyright protection, whereas its subjective creative conception is precisely what copyright law protects. These subjective creative conceptions are very individual and a reflection of the author's understanding based on their interactions and reflections with the external world, the processing of these internally and their unique biopsychology. These issues are tightly

[74] Kampylis and Valtanen (n 68) 198.
[75] van Gompel and Lavik (n 69) 420.
[76] van Gompel (n 56) 104.
[77] Ginsburg (n 11) 1064.
[78] ibid 1072; Ginsburg and Budiardjo (n 13) 12.
[79] Ginsburg (n 11) 1072.
[80] Ginsburg and Budiardjo (n 13) 52.
[81] Zemer (n 36) 27.
[82] Ronald Dworkin, *Taking Rights Seriously* (Duckworth 1977) 135.
[83] Zemer (n 36) 27.

intertwined with the originality standard and the free and creative choices that a human author exercises to create a copyright protected work.

The other element, the 'controlled execution', is equally relevant. There is a clear division between an author and 'an amanuensis'[84], ie someone "employed (willingly) to do the important but sometimes menial work of transcribing the words of another".[85] In the 'Little Prince' scenario, the aviator is no amanuensis; instead, he is a sole author. He would have been an amanuensis had he been engaged in "mindless implementation of mechanical means of production".[86] Exercising subjective choices as far as the contents and the actual act of presentation of a work is precisely what is required to tick the originality box in the framework of copyright law. Originality crops up again in this definition to become that overarching standard of authorship.[87]

3.3.The benchmarks through the lens of genAI

Now, how do these concepts operate in the context of genAI? As the above has demonstrated, the underlying rationale for originality and authorship stems from the recognition that a copyright protected work corresponds to a creative process, which is in itself more than mere investment. As Ginsburg puts it, "*copyright cannot be understood merely as a grudgingly tolerated way station on the road to the public domain…an author is (or should be) a human creator who, notwithstanding the constraints of her task, succeeds in exercising minimal personal autonomy in her fashioning of the work. Because, and to the extent that, she moulds the work to her vision […] she is entitled not only to recognition and payment, but to exert some artistic control over it. If copyright laws do not derive their authority from human creativity, but instead seek merely to compensate investment, then the scope of protection should be rethought and perhaps reduced*."[88] This perspective is particularly relevant in discussions on expanding copyright to AI-generated works.[89] Worldwide, copyright law provides a long term of protection — often the life of the author plus 70 years — along with a robust set of economic rights. Given the significant benefits conferred by copyright protection, it is crucial to approach the extension of these rights to AI-generated content with caution. Once IP rights have been granted, there is very little one can do to roll back and repeal them.[90]

When locating the human authorship and originality in complex genAI systems, it is pertinent to now engage with the technological background of genAI. Most commercially accessible genAI systems nowadays operate with what the technical literature refers to as "prompting". Prompting effectively guides genAI systems, particularly LLMs, in producing high-quality

[84] Ginsburg (n 11) 1077.
[85] 'Definition of AMANUENSIS' (*Merriam-Webster*) <https://www.merriam-webster.com/dictionary/amanuensis> accessed 12 June 2025.
[86] Ginsburg (n 11) 1077, referring to Antoine Latreille, 'L'appropriation des photographies d'oeuvres d'art: éléments d'une réflexion sur un objet de droit d'auteur' (2002) Dalloz, 299, 300-1; On the discussion of 'assistants' in the creative process see Dan L Burk, 'Thirty-Six Views of Copyright Authorship, by Jackson Pollock' (2020) 58 Houson Law Rev 263.
[87] Ginsburg (n 11) 1077.
[88] ibid 1068.
[89] Trapova (n 27).
[90] Martin Husovec, 'The Fundamental Right to Property and the Protection of Investment: How Difficult Is It to Repeal New Intellectual Property Rights?' in Christophe Geiger (ed), *Research Handbook on Intellectual Property and Investment Law* (Edward Elgar Publishing 2020).

outputs.[91] A prompt may consist of text, image, sound, or other media and typically contains a natural language component, but this may not be strictly required in the future.[92] "*Draw me a sheep!*" is a textual prompt. Prompts, typically articulated in natural language, serve as the interface through which users communicate their instructions to the genAI, shaping the model's responses across a wide range of tasks, including output generation, summarisation, and content creation. The effectiveness of genAI systems is highly contingent upon the clarity and specificity of these instructions. Well-constructed prompts can significantly enhance the relevance, accuracy, and utility of the generated output without modifying the underlying model parameters. This iterative process of developing a prompt by modifying or changing the prompting technique is termed as "prompt engineering".[93] What remains an important consideration for the authorship debate is the underlying unpredictability of genAI systems. LLMs are non-deterministic, meaning identical prompts yield completely different responses to separate requests.[94] In some cases, such as Midjourney, users may be able to control to a certain extent these outputs to generate a certain degree of consistent results by including a "seed" value.[95] It appears though that even these systems are unable to guarantee consistency.[96]

Now, one must match this technical background with the copyright framework in authorship and originality, namely the detailed conception and controlled execution benchmarks. Prompts could function as detailed instructions that, in some cases, could approach the level of specificity required for the "detailed conception" limb. There have been instances at the USCO, where prompts have been crafted and iterated upon extensively to achieve a desired output, demonstrating a high degree of detail in conception.[97] However, despite this granularity, a significant gap remains between the prompt and the resulting AI-generated output. The user prompter typically lacks the ability to oversee, direct, or fully understand the contributions made by the AI system during the execution phase. This lack of control over the generative process means that, at present, the degree of human oversight and direction remains insufficient for the controlled execution benchmark to be met.

To tie this to the EU/UK originality standard parameters, it is difficult to see how an author expresses free and creative choices and stamps the work with their personal touch in the output work if they do not engage with the creative process' execution. Some may seek to challenge this position by drawing parallels to using technological tools such as a camera, computer or others which have now become mainstream. That said, the creative control and the room for free and creative choices in those instances is much broader, compared to genAI. Therefore, identifying the human involvement in the creative process and assessing how that involvement is constrained or "free and creative" is central to the analysis. It has been argued that humans may generally intervene in the genAI process in five stages: (i) when assembling the training data; (ii) when designing the model that works with the training data; (iii) in creating the prompts; (iv) in selecting among or modifying outputs delivered by the system, or (v) when

[91] Sander Schulhoff and others, 'The Prompt Report: A Systematic Survey of Prompt Engineering Techniques' (arXiv, 2024) 5 <https://arxiv.org/abs/2406.06608> accessed 12 June 2025.
[92] ibid.
[93] ibid 7.
[94] Shuyin Ouyang and others, 'An Empirical Study of the Non-Determinism of ChatGPT in Code Generation' (arXiv, 2023) 1 <https://arxiv.org/abs/2308.02828> accessed 12 June 2025.
[95] 'Seeds' (*Midjourney*) <https://docs.midjourney.com/hc/en-us/articles/32604356340877-Seeds> accessed 12 June 2025.
[96] US Copyright Office (n 22) 7.
[97] US Copyright Office (n 19); *Second Request for Reconsideration for Refusal to Register Théâtre D'opéra Spatial* (US Copyright Office).

supplying the system with user-created or user-selected content, which the system will treat by executing prompts to generate new content.[98] At the core of the execution stage of genAI models is a probabilistic pattern learning whereby the output is generated from learned probabilistic associations.[99] These can be equated to what copyright case law refers to as technical considerations. The mere presence of such constraints is not a barrier for originality, as per *Cofemel* and *Brompton*, but in the genAI context, the gap between prompts and outputs is so wide that it leaves users with no room for creative expression. Pushing against this argument, parallels have been drawn to Jackson Pollock's creative process as he does not necessarily control the paint drops when they land on his canvas.[100] The parallel, however, is not convincing since, as the USCO has observed, Pollock had not only a vision for his works, but he carried out free and creative choices by selecting the colours, number of layers, depth of texture, placement of each addition to the composition.[101] As such, it is not the elements of randomness that would compromise authorship and originality, but the fact that "the putative author must be able to constrain or channel the program's processing of the source material" – it is a degree of control, rather than predictability of outcome that matters.[102] Consequently, in situations where there is such a high degree of uncertainty about the process of human intellectual creation, which is most likely going to be reflected in the absence of controlled execution, genAI output does not attract copyright protection since it fails to meet the originality and authorship requirements.

IV. **Struggling for creativity – the beauty of human emotions**

So far, this paper engaged with Ginsburg's two benchmarks as applied to the modern genAI processes. It argued that while the prompts might to a certain degree satisfy the detailed conception limb of the benchmark, there is an obvious disconnect between the authorial controlled execution (second limb) and the creative process, which compromises the copyright subsistence claim. The paper now turns to biopsychology to justify that such outcome is in fact normatively sound and does not require any legislative amendment. It brings evidence to this populated academic debate from the discipline of neuroscience. Before that, it contextualises the discussion.

Human beings create, thrive, imagine, dream, sleep, and essentially carry out all cognitive, emotional, behavioural, or physical processes in an interconnected environment. According to psychologists, motivation is one of the requirements for creativity.[103] Motivation in turn necessitates two further elements: focus and commitment.[104] Commitment to the creative process is sometimes a genuine struggle, or as Benedek puts it: "creative thought involves the

[98] Balganesh, Ginsburg and Loengard (n 67) 5.
[99] University of Turin Law School and the Nexa Center for Internet & Society of the Polytechnic of Turin, 'The Development of Generative AI from a Copyriht Perspective' (EUIPO 2025) TB-01-25-001-EN-N 272.
[100] Burk (n 86).
[101] US Copyright Office (n 22) 20.
[102] Balganesh, Ginsburg and Loengard (n 67) 5.
[103] Kampylis and Valtanen (n 68) 198.

[104] Mark Bartholomew, 'Copyright and the Creative Process' (2021) 91 Notre Dame Law Review 357, 589–590.

generation of complex mental representations that need to be maintained over extended periods of time for simulation and elaboration."[105] This struggle engages various perspectives. It could start from the individual creator, but then reflects through the prism of their surroundings. As the psychologist Mihaly Csikszentmihalyi has argued, creativity rests on the interaction of three elements: (i) the individual, ie the creators; (ii) the domain, ie the area of specialised knowledge; and (iii) the field, ie the people who recognise and validate the work.[106] Such interconnectivity can generally be understood as having two dimensions – external and internal.[107] Each offers a valuable perspective for the genAI and copyright authorship debate on how creators relate to themselves and the world around them. This paper's focus is on the internal dimension. That said, a brief account of the debate on external relations is necessary.

4.1.External dimension

Carys Craig and Ian Kerr,[108] Lior Zemer[109] and Abraham Drassinower,[110] among others, have painted a convincing copyright theory that sees authorship as a relational, dialogic and/or communicative act. In an early piece on AI, Carys Craig and Ian Kerr have framed the value of "human creative interaction", and as such authorship, as discursive, necessarily occurring "in the domain of relatedness — a domain alien to the romantic author, of course, and likewise foreign to the machine".[111] In another piece, Carys Craig argues that the lack of intentionality, creative agency and understanding render AI unable to engage in the complex relational and communicative acts necessary for copyright authorship.[112] Following a similar line and calling for the preservation of "the human cause", Daniel Gervais has emphasised that "the progress of humans is directly linked to the progress of ideas, and ideas progress when humans communicate with one another, including through literary and artistic works".[113] This external dimension has been unpacked convincingly by these and many other authors. It underlines the public mission of copyright law according to which authorship is not an isolated lonely act, but takes place when humans engage with the world and one another. In other words, when humans create, express themselves and err, their emotions surface, it is the reaction to these external

[105] Mathias Benedek, 'Internally Directed Attention in Creative Cognition' in Rex E Jung and Oshin Vartanian (eds), *The Cambridge Handbook of the Neuroscience of Creativity* (1st edn, Cambridge University Press 2018) 189 <https://www.cambridge.org/core/product/identifier/9781316556238%23CN-bp-10/type/book_part> accessed 17 September 2025.

[106] Mihaly Csikszentmihalyi, *Creativity: Flow and the Psychology of Discovery and Invention* (1st ed, Harper Collins Publishers 1996) 6.

[107] Reuveni (n 6) 738.

[108] Carys J Craig and Ian R Kerr, 'The Death of the AI Author' (2019) 52 Ottawa Law Review 33, 44; Craig (n 8) 25.
[109] Zemer (n 8).
[110] Drassinower (n 8) 992.
[111] Craig and Kerr (n 108) 85.
[112] Carys J Craig, 'The AI–Copyright Challenge: Tech-Neutrality, Authorship, and the Public Interest' in Ryan Abbott (ed), *Research Handbook on Intellectual Property and Artificial Intelligence* (Edward Elgar 2022) 148–149.
[113] Daniel Gervais, 'Comment Submitted by Professor Daniel Gervas, Vanderbilt University' (US Copyright Office 2023) 1; See more generally, Daniel J Gervais, 'The Human Cause' in Ryan Abbott (ed), *Research Handbooks on Intellectual Property and Artificial Intelligence* (Edward Elgar 2022).

prompts that could trigger a creative process. The rest of this section focuses on the internal aspects which are rooted in the field of neuroscience.

4.2.Mental effects

To tie the neuroscience debate to copyright one needs to look at the purpose of copyright works. Christopher Buccafusco has laid a strong emphasis on a copyright work's role to produce mental effects in an audience, which could be in the form of "thoughts, feelings, emotions, and other states of cognition".[114] This understanding of a copyright protected work has been confirmed in case law on many occasions. For example, in *Sawkins* v *Hyperion Records* in the context of musical works, Jacob LJ in the UK Court of Appeal held the "music is not the same as mere noise. The sound of music is intended to produce effects of some kind on the listener's emotions and intellect."[115] In *Lucasfilm* the UK courts talked about "intrinsic quality of being intended to be enjoyed as a visual thing".[116] Consequently, it appears that emotional and mental impact on the audience is a valuable signpost when it comes to the assessment of whether something is copyright protected. Despite a certain scepticism that it might be fraught with subjectivity, emphasis on the mental state is generally not alien to legal tests.[117]

From Cartesian dualism to emotions

At this point, this article looks inside, into the biology of behaviour to trace the uniquely human aspects of creativity, expressed in emotional and mental impact.

When it comes to understanding behaviour, one of the classic approaches in neuroscience literature is the physiological-psychological dichotomy. Its foundations can be traced to the 16th century and René Descartes's philosophy, also known as the Cartesian dualism, which essentially argues that the universe is made up of two matters: physical and human.[118] The former behaves according to the laws of nature and is a suitable object of scientific investigation, while the latter is the soul, self and spirit; it lacks physical substance, controls human behaviour and obeys no natural laws.[119] The Cartesian dualism is a useful starting point in our thinking about interconnected internal creative processes, even though it has since proved to be somehow misguided.[120] Nowadays, there is scientific evidence suggesting that

[114] Christopher Buccafusco, 'A Theory of Copyright Authorship' (2016) 102 Virginia Law Review 1229, 1266.
[115] *Sawkins* v *Hyperion Records Ltd* [2005] EWCA Civ 565 [53].
[116] *Lucasfilm Ltd* v *Ainsworth* [2009] FSR 103 [118], as confirmed by the Supreme Court in *Lucasfilm Ltd* v *Ainsworth* [2011] UKSC 39.
[117] Bartholomew (n 104) 370.

[118] John Cottingham (ed), *René Descartes: Meditations on First Philosophy: With Selections from the Objections and Replies* (1st edn, Cambridge University Press 2013) <https://www.cambridge.org/core/product/identifier/9781139042895/type/book> accessed 17 July 2025.
[119] D Stoljar, 'Causation: Physical, Mental, and Social', *International Encyclopedia of the Social & Behavioral Sciences* (Elsevier 2001) 1567.
[120] John PJ Pinel and Steven J Barnes, *Biopsychology* (Eleventh edition, global edition, Pearson 2022) 45–46.

even complex changes in psychological states such as emotion, morality and spirituality can be the product of damage to or stimulation of the parts of the brain.[121]

Most biopsychologists agree that the biology of behaviour rests upon three interconnected strands: evolution/genes, experience and perception of the current situation.[122] Therefore, human behaviour and to that end creativity are shaped by a complex interplay of several factors.

First, evolution sets the scene by determining the range of behaviour-related genes present in each of us. At the same time, each person's unique genetic makeup triggers a distinct pathway of brain development. This genetic foundation is not fixed; it is continuously influenced and modified by individual experiences – what the relational theories mentioned above might call 'dialogical and communicative acts'. This process in turn shapes how genes are expressed. The nervous system's organization rely heavily on these ongoing interactions with the internal and external environments.

As a result, every individual's behaviour is determined by its distinctive patterns of brain activity. The experiential side of these can be in the form of thoughts, emotions, and memories. In any given moment, behaviour is produced by the dynamic relationship between these neural patterns and the person's interpretation of their current circumstances. This perspective highlights the deeply personal and variable origins of human expression, which provides a helpful starting point for understanding human creativity and in the copyright law sense – originality and authorship.

As a result, even though the rigid mind-body division is no longer convincing, the soul aspect of the dualism is worth looking it as one that cannot be quantified, calculated and translated into a scientific formula. This is what makes humans *human.* Against this background, a question arises as to what kind of factors trigger an emotional/mental response? Translated into copyright law language, this can be paraphrased as follows: *how does the human nervous system function to create a 'work', which in itself produces mental effects on an audience?* This research question maps well on to the two principal neuroscience approaches employed to examine creativity in the brain – one studies the neural processes responsible for creating works, while the other turns to the neural responses to perceiving works.[123]

In researching the creative process through the lens of neuroscience Mark Bartholomew argues that neuroscience confirms that creative works entail "lengthy planning, deliberation and focus" – features that modern neuroscience is able to measure to a certain degree.[124] Central to these is the creative *process*, which sees emotions play a crucial role.

In 1884, William James and Carl Lange argued that emotions are the result of physiological changes in the body that occur in response to external events.[125] According to this view, one does not cry or laugh because one is sad or happy; rather, we feel sadness because we cry and

[121] Martha J Farah and Nancey Murphy, 'Neuroscience and the Soul' (2009) 323 Science 1168.
[122] Pinel and Barnes (n 120) 49.
[123] Malinda J McPherson and Charles J Limb, 'Artistic and Aesthetic Production: Progress and Limitations' in Rex E Jung and Oshin Vartanian (eds), *The Cambridge Handbook of the Neuroscience of Creativity* (1st edn, Cambridge University Press 2018) 518.

[124] Bartholomew (n 104) 360.

[125] William James, 'II.—What Is an Emotion?' (1884) os-IX Mind 188.

we are happy because we laugh. In essence, the body's automatic physical reactions to stimuli, such as increased heart rate or sweating in the face of fear, come first, and our emotional experience follows as we interpret these bodily changes.

Another convincing interpretation of emotional response that emerged around 1915 is the Cannon-Bard theory, according to which when emotional stimuli are encountered, the brain processes the information and simultaneously triggers *both* the subjective experience of emotion and the corresponding physiological responses.[126] Unlike the James-Lange theory, which suggests that bodily reactions precede and cause emotional feelings, the Cannon-Bard theory argues that emotional and bodily changes occur independently but at the same time. Both theories have been under severe attack over the years.

Modern biopsychology accepts that each of the three principle factors in emotion response can influence the other two. For example, the perception of emotion-inducing stimuli (hearing the lyrics of John Lennon and Yoko Ono's "Imagine" in the turbulence of the world events in 2025); the emotional response (feeling of hope and empathy when hearing the song) and the physiological reaction (tears) all revolve and weigh on each other in an interconnected internal process as Figure 1 demonstrates.

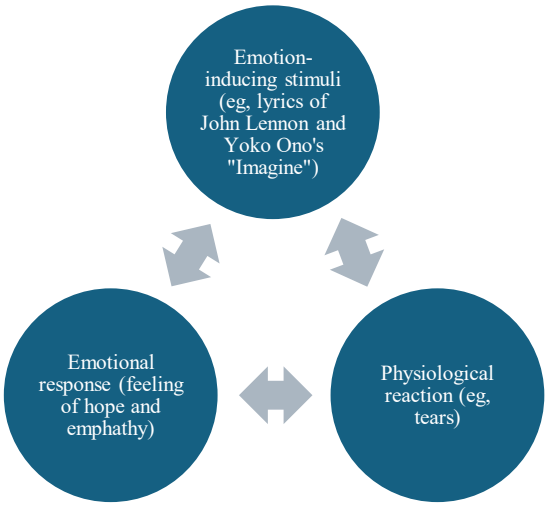

Figure 1: Stimuli - emotions - physiological reaction

For the copyright debate central is the capacity of a situation to produce mental effects on an audience, ie an emotion. Therefore, it is important to appreciate that the process does not thrive in a vacuum of its own, but the different elements are once again interrelated to the other two.

The limbic system

Mapping this onto the nervous system, in 1937 James Papez suggested that emotional expression is governed by a network of interconnected brain regions, now known as the Papez

[126] Note that Cannon was the pioneer of this theory, but Philip Bard helped channel and promote it, which is now known as the 'Cannon-Bard theory'; See more at Walter B Cannon, 'The James-Lange Theory of Emotions: A Critical Examination and an Alternative Theory' (1987) 100 The American Journal of Psychology 567.

circuit.[127] This includes several important structures in the brain, such as the amygdala (notorious for stress and anxiety processing), the hippocampus (crucial for memory), the thalamus (typically responsible for receiving signals from sensory receptors) and the hypothalamus (regulates motivated behaviour and produces hormones). Papez suggested that these structures work together to process and express emotions by relaying and integrating information throughout the brain, with the hypothalamus (the "motivator") playing a key role in translating emotional signals into physiological responses. This laid the foundation for understanding emotion as emerging from coordinated activity across multiple brain areas rather than from a single centre.

This organisation is linked to what we now label as the limbic system. There is no consensus on the exact structure of the limbic system, with the amygdala certainly present in its various iterations. A malfunctioning in any of the elements of the limbic system could potentially result in unchecked amygdala activity, reinforcing the idea that emotional dysregulation is not simply a result of an overactive amygdala but rather an imbalance across interconnected brain structures.

On the basis of this short overview of the areas in the nervous system responsible for emotion, two preliminary conclusions emerge. First, the neuroscience literature and theory suggests that there is no single dominant component within the human nervous system solely responsible for emotions and behaviour. Instead, the various structures charge each other. Second, rather than prioritizing the mind or the body as the primary driver of behavioural and/or emotional response, current understanding points once again to a dynamic, reciprocal relationship between the two. This interplay forms a continuous cycle in which each influences and responds to the other, allowing human beings to adapt to both internal and external environments over time.

V. Computing errors

Tying this to copyright creativity and originality in which the notion of *human* error, the value of struggle and processes will become even more important in the coming years of genAI-driven outputs, this paper argues that that algorithmic creativity cannot be equated to human creativity. There are three counterarguments to this position and this section engages with each in turn. First is the argument that error-making can be coded in the AI system. This implies that certain works coming out of the AI process could bear that unique collectors' touch and thus reflect that error notion which this paper has argued is uniquely human. Tied to this, is the point about hallucination – genAI systems notoriously may generate plausible but inaccurate information.[128] Thus, such hallucinations, some may argue, can be seen as reflective of the unforced errors that render human creative output fascinating. Finally, artificial neural networks, on the basis of which genAI systems have evolved, indeed seek to replicate the

[127] Krishnagopal Dharani, 'Memory', *The Biology of Thought* (Elsevier 2015) <https://linkinghub.elsevier.com/retrieve/pii/B9780128009000000038> accessed 20 June 2025.

[128] Anirban Mukherjee and Hannah Chang, 'The Creative Frontier of Generative AI: Managing the Novelty-Usefulness Tradeoff' (arXiv, 2023) 2–3 <https://arxiv.org/abs/2306.03601> accessed 23 July 2025; 'House of Lords - Large Language Models and Generative AI - Communications and Digital Committee' (House of Lords 2024) HL Paper 54 10 <https://publications.parliament.uk/pa/ld5804/ldselect/ldcomm/54/5402.htm> accessed 19 September 2025.

processes behind the human nervous system. Therefore, an argument could be made that such artificial neural networks are a perfect substitute to the human nervous system. This section explores and rebuts each of these propositions in turn.

First, some may argue that there is nothing that exceptional about human errors which cannot be replicated by virtue of an AI system. As such, errors can be computed and algorithmically planned. Mazzone and Elgammal's early project called AI Creative Adversarial Network, or "AICAN", which even pre-dates modern genAI, could be an example of this point.[129] Having studied the artistic creative process and the manner in which traditional art evolves, the researchers modified the generative adversarial networks system in a way that there are two driving forces in the algorithmic process. On the one hand, the machine would "follow the aesthetics of the art it is shown (minimizing deviation from art distribution)", while, on the other hand, a parallel "force penalizes the machine if it emulates an already established style (maximizing style ambiguity)".[130] Thus deviations, ie error-looking features, can be introduced manually with this second layer. Diving deep into the genAI process' technicalities is beyond the scope of this paper. That said, with the fast pace of development of the technology it is objectively realistic to expect that coding "creative" errors in a genAI model would be a possibility. Would a carefully crafted error of this kind meet the Ginsburg benchmark? This would certainly depend on the level of pre-coding, ie the detailed conception of the error and the controlled execution of it in a way that the AI acts as a tool. If so, then the Gervais binary paradigm applies,[131] and the pre-coded error is the programmer's intellectual creation. Note through, that is as far as the copyright subsistence claim goes – the features of the "error" and not the entire genAI output triggered by any user's prompt.

Second, hallucinations in the creative realm of genAI can be taken as an "emergent property of the creative process".[132] Strictly adhering to the training datasets in addition to bearing complicated questions for copyright infringement of the reproduction right and the application of the text and data mining exception,[133] brings to the forefront the notion of memorisation.[134] To this end, the output can be rather precise and even a verbatim reproduction of the training data content. In the eyes of copyright originality, such output would not be creative. On the contrary, if the process entails hallucinations, namely a generative plausible outcome, which however is not 'accurate' when compared to the input dataset, then one may attempt to argue that such 'hallucinated' outcome is indeed original. Are such unforced hallucinations a reflection of the *human* free and creative choices, their personal touch and emotion? The answer is no. Emotion cannot be computed. Hallucinations are statistical mistakes. There is nothing personal about the human user of the genAI system when the machine hallucinates. Instead, they are statistical calculations that sit closer to the idea side of the idea/expression dichotomy.[135]

[129] Marian Mazzone and Ahmed Elgammal, 'Art, Creativity, and the Potential of Artificial Intelligence' (2019) 8 Arts 26, 29.
[130] ibid.
[131] Gervais, 'The Machine As Author' (n 13) 2069.

[132] Mukherjee and Chang (n 128) 7.
[133] Dusollier and others (n 12).
[134] Ivo Emanuilov and Thomas Margoni, 'Forget Me Not: Memorisation in Generative Sequence Models Trained on Open Source Licensed Code' <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4720990> accessed 23 July 2025.
[135] Trade-Related Aspects of Intellectual Property Rights (TRIPS), art 9(2).

Next, artificial neural networks, the basis for genAI, are structures that highly resemble the functioning of the human brain. These models follow the neuroscience, connectionist logic, where neurons organised in networks establish associations according to the strength of the synapse connection. Two specific features of the artificial neural networks are crucial – its architecture and the neurons connected by weights. The architecture is developed by a programmer prior to the entire training process. It is fixed and does not evolve during the machine learning process and for that reason is characterised as a 'hyperparameter'.[136] On the other hand, the weights (corresponding to synapse connections in the human brain), which connect the neurons, are trainable parameters. The weights are in the form of a numeric value. Being trainable parameters, the weights are automatically optimised during the training process. The neurons which these weights connect are mathematical functions. Consequently, the trained algorithm is a sum of all these mathematical functions.

Even though this artificial representation can, to a certain extent, be paralleled to the human nervous system, the human system is unique in the sense that it is connected to all the other systems in the body, such as the endocrine system, made up of glands that produce hormones and regulating functions such as metabolism, growth, energy, mood and emotional responses. Take the endocrine and the nervous system as an example of interconnectedness. One of the most spoken about molecules in the human body is dopamine. Dopamine, however, functions both as a neurotransmitter (part of the nervous system) and as a hormone (part of the endocrine system), depending on where and how it acts in the body. If found in the brain, it is a chemical messenger between neurons that modulates reward, movement, cognition. If released from the adrenal glands, it travels via blood to act on various organs and regulates physiological functions. This exemplifies that the artificial neural network system, as advanced as it may be, is far from the complexities of the human body and the intricate connections between the different systems in it.

VI. Conclusion

GenAI regulation and copyright is becoming a very sensitive and emotional topic for many within the policy making, but mostly for the artists and creators. In 2025, Sir Elton John spoke out against the UK government's policy direction on genAI training: "*A machine… doesn't have a soul, doesn't have a heart, it doesn't have human feeling, it doesn't have passion. Human beings, when they create something, are doing it… to bring pleasure to lots of people.*"[137] This paper has argued that the foundation of copyright authorship must remain firmly anchored in the human creative process, rather than in the apparent perfection of a finished creative product. Even as artificial intelligence systems, particularly genAI, continue to produce refined outputs to closely mimic human artistic and intellectual works, they do so without embodying the essence of what it means to create through struggle, emotion, error, and reflection.

[136] Josef Drexl and others, 'Technical Aspects of Artificial Intelligence: An Understanding from an Intellectual Property Law Perspective' (Max Planck Institute for Innovation and Competition 2019) 13 6.
[137] Crystal Koe, 'Elton John Slams UK's AI Copyright Plans as "Criminal": "We'll Fight It All the Way"' (*MusicTech*, 19 May 2025) <https://musictech.com/news/industry/elton-john-slams-uk-ai-plan/> accessed 23 July 2025.

The argument advanced here emphasises that creative value stems from process, not just output. As Bartholomew highlights, "copyright law blinds itself to information on the creative *process*, judging creativity by exclusive reference to the final *product*."[138] Drawing on insights from neuroscience, the paper demonstrates that the physiological and emotional dimensions of human creativity, for example the frustration of writer's block, the resilience involved in refining early drafts or ideas, are all grounded in the organisation and functioning of the human nervous system.

Through the application of the Ginsburg benchmarks (detailed conception and controlled execution) this analysis provides a framework for assessing copyright authorship and originality. While detailed conception may be partially achievable through carefully crafted prompts, controlled execution is driven by ongoing reflection, correction, and purposive revision. In the age of AI, human authorship, as this paper has shown, would subsist not in the smooth flawless output of content but in the sometimes messy and inherently imperfect acts of creativity.

Importantly, this is not a call to nostalgically reinstate outdated originality thresholds, nor an attack on AI's utility in creative workflows. Rather, it is a normative claim grounded in scientific and legal reasoning – that copyright must continue to protect the human creators. Neuroscience does not merely support this claim; it demands it. The structures that allow us to feel, get things wrong, struggle meaningfully (or less so), and ultimately create, are not programmable. They are neurologically, psychologically, and biologically human. As such, authorship remains exclusively human not out of tradition or fear of disruption, but because the creative process itself derives its legitimacy from being human. Copyright law must reflect this understanding and reward not the flawlessness of the final product, but the deeply human process of creating, infused with all the imperfections that make it possible.

[138] Bartholomew (n 104) 360.