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Copyright Authorship in the Age of AI: Creativity Can Be Coded *Yapay Zeka Çağında Yazarlık Kavramı: Yaratıcılık Kodlanabilir*

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COPYRIGHT AUTHORSHIP IN THE AGE OF AI: CREATIVITY CAN BE CODED

YAPAY ZEKA ÇAĞINDA YAZARLIK KAVRAMI: YARATICILIK KODLANABİLİR

Abdülbaki Türkmenoğlu 

Dr., Trabzon Üniversitesi Hukuk Fakültesi, Medeni Hukuk Ana Bilim Dalı, Öğretim Görevlisi.

ABSTRACT

Throughout recent history, the development and advancement of machines has constantly challenged the concept of intellectual property and its foundational principles. The mass production of works of authorship through machines led to the emergence of copyright law as a means of protecting the rights of creators. As technology continues to evolve, the development of new forms of machine, such as artificially intelligent systems, has sparked discussions of the concept of authorship in copyright law. Can these advanced machines be deemed creative and produce original works? If so, who should be recognised as the author of these outputs – the creator of the program, the user or the machine itself? With the realisation that artificial intelligence systems, which have flourished in recent years, can produce unique works that are indistinguishable from those created by humans, these questions highlight the need for a careful reconsideration of the fundamental concepts of authorship like creativity and originality in copyright law. In this regard, this article primarily aims to explore the concept of creativity in copyright laws and discuss the arguments against AI creativity. By delving into various theories and approaches to creativity in the fields of psychology, philosophy and neuroscience; it argues that creativity can be coded, and artificial intelligence systems can be creative.

Keywords: Copyright, Intellectual Property, Artificial Intelligence, Creativity, Authorship

ÖZET

Yakın tarihte, makinelerin gelişimi ve ilerlemesi sürekli olarak fikri mülkiyet kavramına ve onun temel ilkelerine meydan okumuştur. Yazarların eserlerinin makineler aracılığıyla kitlesel üretimi, yaratıcıların haklarını korumak amacıyla telif hakkı kanunlarının ortaya çıkmasına yol açmıştır. Teknoloji geliştikçe, yapay zekâ sistemleri gibi yeni makine türlerinin gelişimi, telif hakkı kanununda yazarlık kavramının yeniden tartışılmasını tetiklemiştir. Bu ileri düzey makineler yaratıcı olarak kabul edilebilir ve özgün eserler üretebilirler mi? Eğer öyleyse, bu çıktıların yazarı kim kabul edilmelidir: yapay zekâ yazılımının yaratıcısı mı, onun son kullanıcısı mı yoksa yapay zekânın kendisi mi? Özellikle son yıllarda gelişen yapay zekâ sistemlerinin, insanlar tarafından yaratılanlardan ayırt edilemeyecek derecede özgün eserler üretebildiğinin anlaşılması, telif hakkı hukukunda yaratıcılık ve özgünlük gibi temel kavramların dikkatlice yeniden değerlendirilmesini gerektirmektedir. Bu bağlamda, bu makale öncelikle telif hakkı kanunlarında yaratıcılık kavramını incelemeyi ve yapay zekâ sistemlerinin yaratıcılığına karşı sunulan argümanları tartışmayı amaçlamaktadır. Psikoloji, felsefe ve sinirbilimi alanlarında bazı yaratıcılık teorilerini ve yaklaşımlarını derinlemesine inceledikten sonra; yaratıcılığın kodlanabileceğini ve yapay zekâ sistemlerinin yaratıcı olabileceğini savunmaktadır.

Anahtar Kelimeler: Telif Hakları, Fikri ve Sınai Haklar, Yapay Zeka, Yaratıcılık, Yazarlık

1. INTRODUCTION

Creativity has long been seen as something that makes humans different from other animals and machines.¹ It is often linked to artistic expression, new ideas, and finding solutions to problems, and it is thought to be important for culture and technological growth.² But as artificial intelligence and computer systems get ever more intelligent, there has been more and more discussion about whether creativity can be coded and whether AI systems are deemed creative.³

On the one hand, some contend that incomparable human characteristics prevent machines from duplicating or simulating creativity. They contend that sophisticated cognitive processes associated with creativity, such as inspiration, emotional expression, and intuition, are outside the capabilities of present AI technology. In addition, they note that creativity frequently involves taking risks, making errors, and breaking the norms, which may not be possible or desirable for an AI system programmed to follow predetermined algorithms. Others, on the other hand, contend that, given the proper algorithms and information, creativity is a process that a computer can model and imitate. They highlight instances when AI systems have created works of art, music, and even poetry that have received high appreciation for their uniqueness and aesthetic worth. They also contend that creativity is not intrinsic to humans or their experiences, but rather is a process of coming up with new and beneficial ideas within established constraints and with the achievement of certain ends in mind.

The question whether creativity can be coded and whether AI systems can be considered creative has important implications not only for our understanding of creativity and AI, but also for issues related to copyright law. If AI systems can indeed be creative, this raises questions about who or what should be credited or held responsible for their creative output, and whether AI-generated works should be eligible for copyright protection. Some argue that AI systems should be treated as tools or instruments, and that the human creators or users of these systems should be credited or held responsible for any creative output.

The debate about the creative potential of AI systems has also sparked broader discussions about the role and value of creativity in society. Some worry that the increasing reliance on AI systems for creative tasks could lead to a loss of human creativity and a degradation of

¹ Roland T Rust and Ming-Hui Huang, 'The Feeling Economy' in Roland T Rust and Ming-Hui Huang, *The Feeling Economy* (Springer International Publishing 2021) 139 <https://link.springer.com/10.1007/978-3-030-52977-2_4> accessed 24 December 2022.

² See M Csikszentmihalyi and M Csikszentmihalyi, *Creativity: Flow and the Psychology of Discovery and Invention* (HarperCollinsPublishers 1996) <<https://books.google.co.uk/books?id=K0buAAAAMAAJ>>.

³ See Jane C Ginsburg and Luke Ali Budiardjo, 'Authors and Machines' (2019) 34 *Berkeley Technology Law Journal* 343; Daniel J Gervais, 'The Machine as Author' (2020) 105 *IOWA L. REV.* 2053; Annemarie Bridy, 'Coding Creativity: Copyright and the Artificially Intelligent Author' (2012) 5 *Stanford Technology Law Review* 1; Rosa Maria Ballardini, 'AI-Generated Content: Authorship and Inventorship in the Age of Artificial Intelligence' in Taina Pihlajarinne, Juha Vesala and Olli Honkkila, *Online Distribution of Content in the EU* (Edward Elgar Publishing 2019) <<https://www.elgaronline.com/view/edcoll/9781788119894/9781788119894.00015.xml>> accessed 17 March 2019.

cultural diversity. Others argue that AI systems can augment and enhance human creativity, by providing new sources of inspiration and by enabling the creation of more complex and sophisticated works than would be possible for a single human to produce.

Because the standards for creativity in copyright laws are generally quite low, and even now, generative AI systems are capable of generating works that cannot be distinguished from ones created by humans,⁴ these works may exhibit a level of novelty and originality that exceeds the standards set by current copyright laws. This raises questions about whether the current standards for creativity in copyright are sufficient to capture the full range of creative potential, both human and non-human. Therefore, it may be time for copyright law to reconsider the term ‘creativity’ and the role it plays in determining who or what should be credited or held responsible for creative works.

In this context, this article first examines the current approaches to creativity in US, EU and UK copyright laws and considers the legal implications of these approaches for AI-generated works. It then discusses arguments in favour of the view that creativity is a human trait and non-humans cannot be creative. In the last section, the author of this article argues that creativity can be coded, and machines can be creative by examining theories and approaches to creativity in the fields of psychology, philosophy and neuroscience.

2. CONTEMPORARY APPROACHES TO CREATIVITY IN COPYRIGHT

Copyright is an automatic right that covers a wide range of creative works in physical form.⁵ It gives the creators of original works the right to control how other people use their work for a certain amount of time.⁶ In this respect, creativity and originality lie at the heart of copyright law. In copyright law’s terminology, creators are called authors, but most of the regulations do not provide a clear definition of ‘author’.⁷ Accordingly, what counts as ‘creativity’ and the answer to the question who could be a creator in terms of issues related to copyright law is very important. Internationally, the Berne Convention says that ‘protection shall operate for the benefit of the author’ but it does not define what makes an author

⁴ Russ Pearlman, ‘Recognizing Artificial Intelligence (AI) as Authors and Inventors under U.S. Intellectual Property Law By’ (2018) 24 *Richmond Journal of Law & Technology* 42.art, writings, recipes, and potentially patentable inventions. However, common-law, along with the policies and procedures of the U.S. Copyright Office and the U.S. Patent and Trademark Office, rejects the idea of non-human authorship or inventorship. These doctrines are not based off statutory requirements but on assumptions about computer capabilities stemming from an analysis done in the midtwentieth century, almost 40 years ago.”container-title:”Richmond Journal of Law & Technology”,issue:”2”,language:”en”,note:”4 Stars”,page:”42”,source:”Zotero”,title:”RECOGNIZING ARTIFICIAL INTELLIGENCE (AI)

⁵ Hal R Varian, ‘Copying and Copyright’ (2005) 19 *Journal of Economic Perspectives* 121, 124.

⁶ Lyman Patterson, ‘Copyright and the Exclusive Right of Authors’ (1993) 1 *J. Intell. Prop. L.* 1.

⁷ According to Copyright, Designs and Patents Act 1988 (CDPA) author ‘in relation to a work, means the person who creates it’. However, US Copyright Act of 1976 and directives of the European Parliament and of the Council do not provide a definition for author in relation to copyright.

creative.⁸ In the USA, a work must ‘possess at least some minimal degree of creativity’⁹ to merit copyright protection and it is considered that only human beings can be creative,¹⁰ but the law refrains from defining ‘creativity’. Similarly, case law in the EU recognises creativity as a human trait and protects only the outputs of human creation.¹¹ This assumption is mirrored in the national legislation of civil law nations such as France, Germany and Spain, which require works to contain the author’s personality mark.¹² Even though copyright protection of a work in the UK depends mainly on the author’s ‘skill, labour, and judgement’ and a work originating from an author, interpretations in case law and the provisions of UK copyright law demonstrate the importance of an author’s creativity.¹³ This section examines the current approaches to creativity in the US, EU and UK copyright laws.

2.1. CREATIVITY REQUIRES CREATIVE CHOICES TO BE MADE BY A HUMAN

The US Constitution gives the Federal Government the power to create laws relating to copyrights and patents: ‘The Congress shall have Power... To promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries...’¹⁴ In line with this authorisation, the Copyright Act of 1976 supports creativity by stating that ‘original works of authorship fixed in any tangible medium of expression’ are protected by copyright.¹⁵ Legal support for creativity is associated with economic incentives that grant temporary, monopoly-like rights to the authors of works.¹⁶ This economic incentive, imposed by the Congress to protect authors and their creations, was based on the belief that encouraging individual effort through personal gain is the most effective approach to improve public welfare through the talents of authors expressed in useful arts.¹⁷ In this context, since 1790 – when Congress passed the first copyright laws – one fundamental question in US copyright law has been how far Congress may go in safeguarding the ‘writings’ of ‘authors’.¹⁸ Early cases examining the Constitutional limitations of Congressional authority tended to divide that question into two different but connected Constitutional inquiries: who may be counted as a creator, and what can be counted as a creation for the purpose of copyright protection?¹⁹

In the *Trade-Mark Cases*, for example, the Supreme Court defined ‘writings’ as ‘only

⁸ Berne Convention for the Protection of Literary and Artistic Works, Sept. 9, 1886, as revised in Paris on July 24, 1971 and amended in 1979, S, Treaty Doc. No. 99-27 (1986), Art. 2.6.

⁹ *Feist Publ’ns, Inc. v. Rural Tel. Serv. Co.*, 499 U.S. 340, 348 (1991) (*Feist*) 357–8.

¹⁰ US Copyright Office, *Compendium*, §101 313.2.

¹¹ *Infopaq International v. Danske Dagblades Forening* [2009] ECDR 16 (Case C-5/08) (*Infopaq*) [37]–[39].

¹² See Section 2.2.

¹³ See Section 2.3.

¹⁴ U.S. Constitution, art. I, § 8, cl. 8.

¹⁵ The Copyright Act of 1976, S 102 (a).

¹⁶ Craig Joyce (ed), *Copyright Law* (8th ed, LexisNexis 2010) 20.

¹⁷ *Mazer v. Stein*, 347 U.S. 201, 219 (1954).

¹⁸ Bridy (n 3) 4.

¹⁹ *ibid* 5.

those that are original and are grounded in the creative faculties of the mind'.²⁰ Unlike trademark insignia, works eligible for copyright protection, according to the Court, are restricted to 'the fruits of intellectual labour' and 'rely on brain function'.²¹ Later, in *Burrow-Giles*, an author is defined as 'he to whom anything owes its origin; originator; maker; one who completes a work of science or literature'; and copyright is 'the exclusive right of a man to the production of his own genius or intellect'.²² The Court determined that 'author' may also be interpreted in terms of causation: the author is 'the cause of the picture' and 'the man who... gives effect to the idea, fancy, or imagination'.²³ A photo was taken by a camera, but the composition was created by the person behind the lens.²⁴ The camera was only used as a tool to help the human operator realise his or her creative vision, which is the basis for copyright in the final work.²⁵

Justice Holmes, in *Bleistein v. Donaldson Lithographing Co.*, proposed an authorship approach based on the fundamental uniqueness of human personality: 'The copy is the personal reaction of an individual upon nature. Personality always contains something unique... something irreducible, which is one man's alone. That something he may copyright'.²⁶ Although this more modest view of authorship-as-personality does away with the language of genius and intelligence, it emphasises individual authorship and the human aspect that the court stressed in *Burrow-Giles*.²⁷ From *Burrow-Giles* to *Bleistein*, the legal construction of authorship evolved – or, rather, devolved – from genius or creativity to mere personhood.²⁸ The Court in *Bleistein* ruled that for the purpose of copyright protection a creation does not require a connection to the arts or high culture; it simply requires the mark of a unique personality.²⁹ This democratising recalibration of the originality threshold marks the jurisprudential moment when copyright protection became almost assured for every work produced by a human hand with some creativity, regardless of perceived ingenuity or artistic value.³⁰

Later rulings using the *Bleistein* approach for copyright protection established a low-water mark: 'The artistic work must be "original", but this means no more than that the work must not be copied from another artistic work of the same character'.³¹ In *Bell*, creations worth copyright protection were defined as 'a marked departure from the past', not 'startling, novel or unusual'.³² The court stated that such a high creative bar is reserved for patent

²⁰ See *Trade-Mark Cases*, 100 US 94.

²¹ *ibid.*

²² *Burrow-Giles Lithographic Co. v. Sarony* 111 US 53 (1884) (*Burrow-Giles*).

²³ *ibid* 58–59, 61.

²⁴ *ibid* 61.

²⁵ *ibid.*

²⁶ *Bleistein v. Donaldson Lithographing Co.*, 188 US 239 (1903), 250 (*Bleistein*).

²⁷ *ibid* 6.

²⁸ *ibid.*

²⁹ See *Bleistein* (n 26).

³⁰ *Bridy* (n 3) 6.

³¹ *Ansehl v. Puritan Pharm. Co.*, 61 F.2nd 131 (8th Cir. 1932), 136.

³² *Alfred Bell & Co. v. Catalda Fine Arts, Inc.*, 191 F.2nd 99 (2nd Cir. 1951), (*Bell*), 102.

law.³³ However, the court had argued in *Sony* that the privileges of copyright are ‘intended 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.’³⁴ By demanding the mark of creativity rather than the effort, time or money involved in the creation process, the Supreme Court underlined the necessity for a creative consideration that society can anticipate from its deal with the author, and explained that copyright is not an investment protection scheme.³⁵

Similarly, the Seventh Circuit in *Baltimore Orioles, Inc. v. Major League Baseball Players Association* stated that not being a copy is not enough to qualify a work as a creation worth copyright protection.³⁶ According to the Court originality, creativity and novelty are three characteristics that must be distinguished. If a work is created independently by its author, it is considered ‘original’.³⁷ If some intellectual labour has gone into a work, it is considered ‘creative’, and it is ‘novel’ if it varies from previous works in any significant way.³⁸ A work must be original and creative, but not necessarily novel, to be copyrightable. (As a result, unlike patent law, a work created independently by two writers can be copyrighted by both.)³⁹

According to the Supreme Court in *Feist*, a work ‘is copyrightable only if it satisfies the originality requirement... the originality requirement applies to all works’.⁴⁰ Then the Court explained the meaning of originality: ‘Original, as the term is used in copyright, means only that the work was *independently created by the author* (as opposed to copied from other works), and that it possesses *at least some minimal degree of creativity*’.⁴¹ In other words, *creative choices* observable in *selection and arrangement* were required to establish substantial originality and deserve copyright protection.⁴² According to the *Feist* concept of choices, a choice is creative if:

- *made independently by the author* and
- *not dictated by the function of the work, the method or technique used, or by applicable standards or relevant good practice* (‘practical inevitability’) (because there is no opportunity for creativity when function determines the path to be taken) and
- *selection that is just random, arbitrary, or meaningless is inadequate*.⁴³

³³ *ibid.*

³⁴ *Sony Corp. of America v. Universal City Studios, Inc.*, 464 US 417 (1984), 429.

³⁵ Gervais (n 3) 2090. See also *Feist* (n 9), 357–8.

³⁶ *Baltimore Orioles, Inc. v. Major League Baseball Players Ass’n*, 805 F.2nd 663-668 (7th Cir. 1986), (*Baltimore Orioles*).

³⁷ *ibid.*

³⁸ *ibid.*

³⁹ *ibid.*

⁴⁰ *Feist* (n 9) 344-6.

⁴¹ *ibid* 345.

⁴² *ibid* 348.

⁴³ Gervais (n 3) 2090–91.

Until the *Feist* judgment, creativity had taken an unclear place in the copyright debate.⁴⁴ However, the Court's subsequent statement emphasised the importance of creativity in the copyright protection analysis: 'As a constitutional matter, copyright protects only those constituent elements of a work that possess more than a *de minimis* quantum of creativity'.⁴⁵ Nonetheless, the Court was ambiguous on the meaning of creativity in copyright law and its categorical rejection of the routine and the mechanical tacitly places the work done by machines beyond the scope of copyright, reaffirming the long-held *Burrow-Giles* view that simple mechanical labour is not creative: 'As mentioned, originality is not a stringent standard; it does not require that facts be presented in an innovative or surprising way. It is equally true, however, that the selection and arrangement of facts cannot be so mechanical or routine as to require no creativity whatsoever.'⁴⁶

In a more recent case,⁴⁷ the US District Court of the Northern District of California addressed the issue of animal ownership in photographic works, in which a monkey used a photographer's camera to take an image of itself.⁴⁸ The monkey's claim for authorship was rejected by the court because copyright law mostly refers to a 'person' involved in the creation of the work, and for a work to qualify for copyright protection, it has to be created by a person.⁴⁹ Even though People for the Ethical Treatment of Animals (PETA),⁵⁰ on behalf of Naruto, filed an appeal, the dispute was subsequently resolved without going to court.⁵¹ This case is consistent with the United States Copyright Office's *Compendium*,⁵² which clearly prohibits protection of non-human creations.⁵³

In sum, under US copyright law, a work is considered a creation meriting copyright protection if it is made independently by an author and possesses at least some degree of creativity. Creativity refers to the choices made in the selection and arrangement of elements in a work that are not determined by the purpose of the work, the methods or techniques used, or by established standards or best practices. For a work to be considered creation, the final condition is creation by a human being.

⁴⁴ Alfred C Yen, 'The Legacy of *Feist*: Consequences of the Weak Connection Between Copyright and the Economics of Public Goods' (1991) 52 Ohio St. Law Journal 1343, 1344, 1344.","plainCitation": "Alfred C Yen, 'The Legacy of *Feist*: Consequences of the Weak Connection Between Copyright and the Economics of Public Goods' (1991

⁴⁵ See *Feist* (n 9).

⁴⁶ *Feist* (n 9) 362.

⁴⁷ *Naruto v. David John Slater et al.*, No. 3:2015cv04324 – Document 45 (N.D. Cal. 2016), settled out of court.

⁴⁸ *ibid.*

⁴⁹ *ibid* 6.

⁵⁰ A non-profit animal rights organisation. See 'About PETA' (PETA) <<https://www.peta.org/about-peta/>> accessed 24 September 2023.

⁵¹ Zachary Toliver, 'The "Monkey Selfie" Case Has Been Settled — This Is How It Broke Ground for Animal Rights' (PETA, 11 September 2017) <<https://www.peta.org/blog/settlement-reached-monkey-selfie-case-broke-new-ground-animal-rights/>> accessed 25 December 2022.

⁵² 'To qualify as a work of "authorship" a work must be created by a human being.' The US Copyright Office, *Compendium of US Copyright Office Practices* (3rd edn, 2021), Chapter 300 <https://www.copyright.gov/comp3/chap300/ch300-copyrightable-authorship.pdf> 313.2.

⁵³ Jani Ihalainen, 'Computer Creativity: Artificial Intelligence and Copyright' (2018) 13 Journal of Intellectual Property Law & Practice 724, 726.

2.2. CREATIVITY AS AUTHOR'S PERSONALITY

The reference to creativity in EU copyright law can be found in Directive 96/9/EC on the legal protection of databases (Database directive), Directive 2006/116/EC on the term protection of copyright and certain related rights regarding photographs (Term directive) and Directive 2009/24/EC on the legal protection of computer programs (Software directive). Under Article 3(1) of the Database directive, 'databases which, by reason of the selection or arrangement of their contents, constitute *the author's own intellectual creation* shall be protected as such by copyright. No other criteria shall be applied to determine their eligibility for that protection.'⁵⁴ Similarly, the Term directive's Article 6 states that '[p]hotographs which are original in the sense that they are the *author's own intellectual creation* shall be protected in accordance with Article 1. No other criteria shall be applied to determine their eligibility for protection.'⁵⁵ Even though this article states that only works that are the author's own intellectual creation will be protected, Recital 16 of the directive's preamble explains that a photographic work is deemed original if it is the author's own intellectual production representing his 'personality'.⁵⁶ Similar wording can also be found in Article 1(3) of the Software directive: '[a] computer program shall be protected if it is original in the sense that it is the *author's own intellectual creation*. No other criteria shall be applied to determine its eligibility for protection.'⁵⁷

One of the first examples of the 'author's own intellectual creation' condition for works to be protected by copyright can be seen in German Act on Copyright and Related Rights. According to Article 69a (3) of the German Act on Copyright and Related Rights, 'computer programs shall be protected if they represent individual works in the sense that they are the result of *the author's own intellectual creation*. No other criteria, especially qualitative or aesthetic criteria, shall be applied to determine its eligibility for protection.'⁵⁸ According to a 1985 ruling of the German Federal Supreme Court in *Inkassoprogram*,⁵⁹ a computer program may only be protected by copyright in Germany if it exhibits a degree of creativity above the ordinary ability prevalent in works of this kind.⁶⁰ Similarly, the Italian copyright laws grant copyright to intellectual works with a creative character.⁶¹ According to the Italian courts, the creative character condition is met when a work is 'the result of the expressive endeavour of the author, mirroring the author's personal way of representing facts,

⁵⁴ Directive 96/9/EC on the legal protection of databases ('Database directive'), Art. 3(1).

⁵⁵ Directive 2006/116/EC on the term protection of copyright and certain related rights regarding photographs (Term directive), Art. 6.

⁵⁶ Term directive, Recital 16.

⁵⁷ Directive 2009/24/EC on the legal protection of computer programs (Software directive), Art. 1(3).

⁵⁸ Translation can be found at https://www.gesetze-im-internet.de/englisch_urhg/englisch_urhg.html.

⁵⁹ BGH GRUR 1985, 1041/1047.

⁶⁰ Frederick M Abbott, Thomas Cottier and Francis Gurry, *International intellectual property in an integrated world economy* (2nd edn, Wolters Kluwer Law & Business, 2011) 610–11.

⁶¹ Art. 1(1), Legge 22 April 1941, No 633 – Protezione del diritto d'autore e di altri diritti connessi al suo esercizio ('Protection of copyright and other rights connected to its exercise') and Art. 2575, Codice Civile ('Civil Code').

ideas, situations and feelings'.⁶²

For copyright protection in both France and Spain, the source of creativity must be human. This is reinforced by the French Code, which defines protected subject matter as 'œuvres de l'esprit'.⁶³ The term 'esprit' (mind) refers to human, not artificial, authors: 'the part of a person that makes them able to be aware of things, to think and to feel'.⁶⁴ When it comes to copyright protection in Spain, the fundamental elements of the law are defined as '... the rights that correspond to the author, that is the person who realised the purely human and personal effort of creating the work and that, for that reason, constitute the essential nucleus of the subject matter'.⁶⁵ Additionally, Spanish law establishes that a natural person who produces a work is the author.⁶⁶

Although numerous formulations have been adopted in civil law countries, seeing copyright protection as being provided for 'the author's own intellectual creation' may be recognised as a valid assumption on the continent.⁶⁷ In the current continental understanding, to merit copyright protection a work does not need to demonstrate a specified level of novelty, but the personality of the author must be apparent in the process of creating the final product.⁶⁸ In *Infopaq*, the Court of Justice of the European Union (CJEU) harmonised the complex conceptions of 'originality' and 'creativity'. While the EU legislative has harmonised the originality criterion only for computer programs, databases and photos, the CJEU held in *Infopaq* that the meaning of originality provided in Database, Term and Software directives also applies under the InfoSoc directive (2001/29).⁶⁹ In this regard, the Court harmonised the originality requirement in three steps, and established a link between the act of generating a copyrightable creation and the human being who creates it, so that where there is no natural person behind a work, there is no creation subject to copyright protection.⁷⁰

[C]opyright within the meaning of Article 2(a) of Directive 2001/29 is liable to apply only in relation to a subject-matter which is original in the sense that it is

⁶² Tribunal of Milan, Sezione specializzata in materia di impresa, ordinanza February 4, 2015, AIDA 1743, 1745 (2016). See also Enrico Bonadio and Nicola Lucchi, *Non-Conventional Copyright* (Edward Elgar Publishing 2018) 387 <<https://www.elgaronline.com/view/edcoll/9781786434067/9781786434067.xml>> accessed 4 November 2021.

⁶³ In the French government's English translation, 'works of the mind'. See Art. L112-1, French Code de la Propriété Intellectuelle. English text at: <https://www.wipo.int/edocs/lexdocs/laws/en/fr/fr467en.pdf>.

⁶⁴ See 'Mind_1 Noun - Definition, Pictures, Pronunciation and Usage Notes | Oxford Advanced Learner's Dictionary at OxfordLearnersDictionaries.Com' <https://www.oxfordlearnersdictionaries.com/definition/english/mind_1?q=-mind> accessed 24 September 2023.

⁶⁵ See Art. 5, Ley de Propiedad Intelectual (BOE 1996, 8930).

⁶⁶ Bonadio and Lucchi (n 62) 387–388.

⁶⁷ Andreas Rahmatian, 'Originality in UK Copyright Law: The Old "Skill and Labour" Doctrine Under Pressure' (2013) 44 IIC – International Review of Intellectual Property and Competition Law 4, 7.

⁶⁸ *ibid* 18.

⁶⁹ Directive 2001/29/EC on the harmonisation of certain aspects of copyright and related rights in the information society.

⁷⁰ Eleonora Rosati, 'Originality in a Work, or a Work of Originality: The Effects of the *Infopaq* Decision Part I: Articles' (2011) 58 Journal of the Copyright Society of the USA 795, 802.

its author's own intellectual creation.

As regards the parts of a work, it should be borne in mind that there is nothing in Directive 2001/29 or any other relevant directive indicating that those parts are to be treated any differently from the work as a whole. It follows that they are protected by copyright since, as such, they share the originality of the whole work...

[T]he various parts of a work thus enjoy protection under Article 2(a) of Directive 2001/29, provided that they contain elements which are the expression of the intellectual creation of the author of the work.⁷¹

In later judgments, the CJEU went into greater depth on the concept 'author's own intellectual creation'. It stated in *BSA*, for instance, that 'the graphic user interface can, as a work, be protected by copyright if it is its author's own intellectual creation...'⁷² A similar statement can also be found in the *FAPL* decision: 'To be so classified, the subject-matter concerned would have to be original in the sense that it is its author's own intellectual creation'.⁷³ The *Painer* decision provides another step by pointing out that a work is protected by copyright only if it is original in the sense that it is its author's own intellectual creation and represents the author's personality.⁷⁴ According to the Court this would be the case 'if the author was able to express his creative abilities in the... production of the work by making *free and creative choices*'.⁷⁵ This shows that to be protected by copyright creations must entail some level of human creativity as Advocate-General Trstenjak said in his Opinion in *Painer*: 'only human creations are... protected'.⁷⁶

In sum, according to the CJEU's reasoning in these judgments, copyright protection should only arise if a work is a result of the 'author's own intellectual creation' and if its human creator made 'free and creative choices' during its creation. The CJEU determined additionally that a work that is completely dictated by its technological functionality, meaning that it had only been made to accomplish a given technical result, cannot be protected by copyright law.⁷⁷ In this regard, the Court state that 'Where the expression of [...] components [of a work] is dictated by their technical function, the criterion of originality is not met, since the different methods of implementing an idea are so limited that the idea and the expression become indissociable.'⁷⁸ As a result under EU copyright law creativity can be described as a human author's personality.

⁷¹ *Infopaq* (n 11) [37]–[39].

⁷² *Bezpečnostní softwarová asociace — Svaz softwarové ochrany v. Ministerstvo kultury* C-393/09, [2011] E.C.D.R. 3 (2010), (*BSA*) para. 46.

⁷³ *Football Association Premier League Ltd v QC Leisure* (C-403/08) [2011] E.C.D.R. 11 (03 February 2011) (*FAPL*) para. 97.

⁷⁴ Case C-145/10 *Eva-Maria Painer v. Standard Verlags GmbH, Axel Springer AG, Süddeutsche Zeitung GmbH, SPIEGEL-Verlag Rudolf AUGSTEIN GmbH & Co. KG and Verlag M. DuMont Schauberg Expedition der Kölnischen Zeitung GmbH & Co. KG*, [2013] ECR I-138 [85–88].

⁷⁵ *ibid* [89] (emphasis added).

⁷⁶ *ibid* Opinion of Advocate-General Verica Trstenjak, 12 April 2011.

⁷⁷ *ibid* para. 92, and Case C-604/10 *Football Dataco/Yahoo* [2012] para. 38.

⁷⁸ *BSA* (n 72) para. 49.

2.3. CREATIVITY AS MORE THAN SKILL, LABOUR AND JUDGEMENT

Even though conditions for copyright protection in copyright law in the European Union have been developed around authors and their personality, a more impersonal test of ‘labour and skill’ has been adopted in the United Kingdom, which requires less connection to a human being for works to be copyrightable. Under section 1(1)(a) of the Copyright, Designs and Patents Act 1988 (c.48) (CDPA) copyright protection is not given to literary, dramatic or musical works that are not original. Although a clear definition of the term ‘original’ is not provided in the Act, a distinct understanding of originality has arisen in UK case law, which has historically interpreted it to mean ‘originating’ from the author.⁷⁹

In *Dick v. Yates*, one of the earliest cases dealing with copyrightability of a work, Lord Justice Lush stated it ‘to be established law that to be the subject of copyright the matter must be original, it must be a composition of the author, something which has grown up in his mind, the product of something which if it were applied to patent rights would be called invention. Nothing short of that would entitle a man to copyright.’⁸⁰ *Walter v. Lane* took a step further by holding that a work merits copyright protection when a sufficient level of skill, labour or judgement is discovered.⁸¹ Following adoption of the requirement for originality under statutory copyright law in 1911, Peterson J held in *University of London Press Ltd v. University Tutorial Press Ltd* that:

“[t]he word ‘original’ does not in this connection mean that the work must be the expression of original or inventive thought. Copyright Acts are not concerned with the originality of ideas, but with the expression of thought... The originality which is required relates to the expression of the thought. But the [Copyright] Act does not require that the expression must be in an original or novel form, but that the work must not be copied from another work – that it should originate from the author.”⁸²

Since 1911, this idea of originality has remained mostly unchanged, and it continues to be used to justify the need for originality in UK legislation.⁸³ The court in *Ladbroke (Football) Ltd v. William Hill (Football) Ltd*, for example, stated that ‘... originality is a matter of degree depending on the amount of skill, judgement or labour that has been involved in making the compilation’.⁸⁴ In another case, a sufficient level of skill (above the minimum), labour or judgement was deemed to satisfy the criterion of originality.⁸⁵ However, as

⁷⁹ Rosati (n 70) 803.

⁸⁰ (1881) 18 Ch D 76. This case was however distinguished in *Walter v. Lane*, cit.

⁸¹ *Walter v. Lane* [1900] A.C. 539; [1900] 8 WLUK 11 (HL). For detailed analysis of *Walter v. Lane* see Nigel P Gravells, ‘Authorship and Originality: The Persistent Influence of *Walter v. Lane*’ (2007) 3 Intellectual Property Quarterly 267.

⁸² *University of London Press Ltd v. University Tutorial Press Ltd*. [1916] 2 Ch 608.

⁸³ See Garnett, Davies and Harbottle, *Copinger and Skone James on copyright*, Vol. I, 141.

⁸⁴ *Ladbroke (Football) Ltd v. William Hill* [1964] 1 WLR 273 at 291.

⁸⁵ *Express Newspapers plc v. News (UK) Ltd* 1990.

Lord Oliver of Aylmerton stated in *Interlego v. Tyco Industries*,⁸⁶ ‘skill, labour, or judgement merely in the process of copying cannot confer originality’.⁸⁷ In the same way, it was stated in *Football Dataco Ltd and Others v. Brittens Pools Ltd and Others* that ‘to be original, the work must not be a mere copy of a pre-existing work: it must originate with the author rather than anyone else’.⁸⁸ Hence, historically, in the United Kingdom a work was deemed to be original if it was the outcome of the author’s ‘skill, labour and judgement’.

Section 9(3) CDPA, however, clearly provides an exception to the criterion of originality as it has traditionally been understood by UK courts: ‘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’. A computer-generated work, under the CPDA, is one that is created by a computer in a situation where no human author is involved.⁸⁹ Section 9(3) effectively creates a legal fiction. According to this definition, the author is a person who has not actually created the work, but has just established the necessary preparations for its production to take place. The underlying reason for this ‘deemed author’ approach is the adoption of the idea that only human beings can be considered author in copyright law. Section 9(3) broadens the definition of author by considering the objective production of the output and then determining the most likely proximate ‘author’ (and owner).⁹⁰

In sum, under UK copyright law, a work deserves copyright protection if it was created independently by the author’s own skill, mental labour or judgement and not simply copied. If a work is generated without a human author involved, the author is the person closest to the creation process who employs ‘skill, labour or judgement’, even though that person has not actually created the work. In this regard, the current approach to creativity in UK copyright law can be defined as a human being’s ‘skill, labour and judgement’, but mere ‘skill, labour or judgement’ in the process of creation is not enough for a work to merit protection by copyright; a bit more than that is needed. And case law requires that to originate with the author rather than anyone else. This additional condition can be considered as creativity needed for a work to be ‘original’ in UK law.

As demonstrated in this section, while common law copyright systems are concerned with the work and its potential economic worth, author’s rights regimes are concerned with the author and seek to preserve that person’s work on the grounds that it contains signs of their personality. In the EU, it is not the work itself that protects the author (or the person who made it): it is the author’s identity as a person that protects the works that come from

⁸⁶ [1989] AC 217, (*Interlego*).

⁸⁷ *ibid.*

⁸⁸ *Football Dataco Ltd & Ors v. Brittens Pools Ltd (In Action 3222) & Ors* [2010] EWHC 841 (Ch) (23 April 2010) para. 53.

⁸⁹ CDPA Section 178: “‘computer-generated’, in relation to a work, means that the work is generated by computer in circumstances such that there is no human author of the work...’

⁹⁰ Timothy Butler, ‘Can a Computer be an Author?’ (1982) 4 *Hastings Comm. & Ent. L.J.* 707, 744–5.

that person.⁹¹ As a result, while in the USA creativity in copyright can be described as creative choices observable in the selection and arrangement, and as a bit more than mere skill, labour and judgement in the UK, it can be defined as a human being's personhood for the purpose of copyright protection in the EU. In any case, for now, it seems that creativity in copyright requires the author to be a human being.

3. CREATIVITY IS A HUMAN FACULTY

The primary requirement for obtaining copyright in these jurisdictions is that the work of authorship must be original and originality in copyright law requires creativity.⁹² In other words, creative choices observable in selection and arrangement are required to establish originality deserving of copyright protection.⁹³ Should human creativity, however, be required under copyright law? As mentioned in Part 1 of this Article, this question can easily be answered affirmatively in the EU and the USA. A work produced without 'any creative input or intervention from a human author' is not protected by the US Copyright Office and,⁹⁴ to be considered copyrightable, that work needs to demonstrate the personality of the author in the process of creating the final product under EU copyright law.⁹⁵ The presumption that authorship is synonymous with human authorship, motivated by practical and historical concerns, can also be seen in both US and EU case law.⁹⁶ The 1965 Annual Report of the Register of Copyrights addresses the issue explicitly in terms of a human–computer gap.⁹⁷ If a work is created by a human being, it is copyrighted.⁹⁸ If it is created by a machine, it is not.⁹⁹ The Commission on New Technological Uses of Copyrighted Works (CONTU) report concludes the same way: without some degree of human creative endeavour, there is no protection.¹⁰⁰

Since the 1980s, experts in copyright law have been debating whether machines may be creative for the purpose of copyright and whether their creations can be legally protected under existing copyright regimes.¹⁰¹ Many examples of 'creation by machines' may be found, from news reports¹⁰² to musical compositions¹⁰³ and works of visual art that are fas-

⁹¹ Eleonora Rosati, *Originality in EU Copyright: Full Harmonization through Case Law* (Edward Elgar Publishing Limited 2013) 69.

⁹² See Section 2.

⁹³ *Feist* (n 9) 348.

⁹⁴ US Copyright Office, *Compendium* (n 14) §101 313.2.

⁹⁵ See *Infopaq* (n 11); *Painer* (n 74) [89] and Opinion of AG Trstenjak.

⁹⁶ See *Naruto v. Slater*; *Infopaq*, para. 45; *BSA*, para. 50; *Painer*, para. 89; and *Funke Medien NRW GmbH v Bundesrepublik Deutschland* C-469/17 [2019] para. 20.

⁹⁷ Register of Copyrights, *Sixty-Eighth Annual Report of The Register of Copyrights* (1966) 5.

⁹⁸ *ibid.*

⁹⁹ *ibid.*

¹⁰⁰ National Commission on New Technological Uses of Copyrighted Works, Final Report.

¹⁰¹ *Bridy* (n 3) 21–27. See also *Ginsburg and Budiardjo* (n 3) 394–7.

¹⁰² 'RADAR AI Generated News Stories - from PA Media' (RADAR AI generated news stories - from PA Media : PA Media) <<https://pa.media/radar/>> accessed 25 December 2022.

¹⁰³ 'AIVA - The AI Composing Emotional Soundtrack Music' <<https://www.aiva.ai/>> accessed 25 December 2022.

hioned after the work of famous artists.¹⁰⁴ Accordingly, numerous experts have stated that copyright is experiencing a ‘digitally induced crisis’ as a result of the emerging issue of AI creativity and procedurally generated works produced by computers programmed to create works that replicate human creativity.¹⁰⁵ However, others argue that modern AI is ‘not really like human intelligence at all’.¹⁰⁶ It is widely accepted that creativity is a human faculty and only human beings can be creative.¹⁰⁷ Even the most advanced AI systems are intricate logical labyrinths meant to replicate tiny slices of human intellect using ‘brute-force computational strength’ and they cannot be considered creative in the context of copyright law.¹⁰⁸ This section examines arguments in favour of the view that creativity is a human trait and non-humans cannot be creative.

3.1. THE PROCESS MATTERS, NOT THE PRODUCT

For some commentators, copyright is a legal instrument intended to assist in the production of works that are the outcome of a human creative process; the motivation is for people to participate in the process regardless of whether the outcome is a blank sheet or *The Tragedy of Hamlet*.¹⁰⁹ According to them, ‘creativity is a positive virtue, not just because of its results but because of how the process of making meaning contributes to human flourishing’.¹¹⁰ It is thought to be ‘the natural human process of becoming sensitive to problems, deficiencies, gaps in knowledge, missing elements, disharmonies, and so on; identifying the difficulty; searching for solutions, making guesses, or formulating hypotheses about the deficiencies; testing and retesting these hypotheses and possibly modifying and retesting them; and finally communicating the results’.¹¹¹ For this reason, it can be argued that creating a unique work is irrelevant since copyright does not need novelty and is interested

¹⁰⁴ ‘The Next Rembrandt’ (The Next Rembrandt) <<https://www.nextrembrandt.com>> accessed 25 December 2022.

¹⁰⁵ Bridy (n 3) 69; Enrico Bonadio and Luke McDonagh, ‘Artificial Intelligence as Producer and Consumer of Copyright Works: Evaluating the Consequences of Algorithmic Creativity’ (2020) 2 Intellectual Property Quarterly 112; Kalin Hristov, ‘Artificial Intelligence and the Copyright Survey’; Kyung Hee Kim, ‘The Creativity Crisis: The Decrease in Creative Thinking Scores on the Torrance Tests of Creative Thinking’ (2011) 23 Creativity research journal 285; Nina I Brown, ‘Artificial Authors: A Case for Copyright in Computer-Generated Works’ (2018) 20 Colum. Sci. & Tech. L. Rev. 1.

¹⁰⁶ Ron Miller, ‘Artificial Intelligence Is not as Smart as You (or Elon Musk) Think’, *Techcrunch* (25 July 2017), <https://techcrunch.com/2017/07/25/artificial-intelligence-is-not-as-smart-as-you-or-elon-musk-think/> [perma.cc/BUR8-T7GH]; Nick Ismail, ‘True AI Doesn’t Exist Yet... It’s Augmented Intelligence’, *Info. Age* (11 September 2017), <http://www.information-age.com/true-ai-doesnt-exist-augmented-intelligence-123468452/>. [perma.cc/4P9V-6Y5Z].

¹⁰⁷ Dahlia W Zaidel, ‘Creativity, Brain, and Art: Biological and Neurological Considerations’ (2014) 8 *Frontiers in Human Neuroscience* 389, 6.

¹⁰⁸ Ginsburg and Budiardjo (n 3) 401.

¹⁰⁹ Gervais (n 3) 2092–2094.

¹¹⁰ Rebecca Tushnet, ‘Economies of Desire: Fair Use and Marketplace Assumptions’, (2009) 51 *Wm. & Mary L. Rev.* 513, 537.

¹¹¹ EP Torrance, ‘Scientific Views of Creativity and Factors Affecting Its Growth’, (1965) 94 (3) *Creativity and Learning* 663, 663–4.

chiefly in outcome; it requires the independent production of works of authorship.¹¹²

In this view, creativity is mostly a process; it is a method of self-expression. People create because doing so is fundamental to their existence and being. Spirituality, world view, moral values, aesthetic ideals and orientations may all be revealed via creativity. If individuals use their imagination and ingenuity, they can create something that did not previously exist and thereby alter the world.¹¹³ Creative process is diverse and heterogeneous; it encompasses both self-knowledge and cognition, and can rethink the world; it might be focused on discovering new solutions to problems or refining known ones; it can foster existing societal trends or work against them.¹¹⁴ Based on this reasoning, only human beings can create works meriting copyright; only direct human creations can be considered as creation subject to copyright protection.¹¹⁵ As a result, any non-human entities such as artificial intelligence systems cannot be creative. They may generate original content, but this is irrelevant from a copyright standpoint since novelty does not merit copyright; rather, copyright protects the independent human production of works of original authorship.¹¹⁶

The process by which computers generate works can be divided into three main phases. By defining the potential types and amounts of human participation at each stage, AI creations may be protected by copyright law.¹¹⁷ The first step is *the selection and categorisation of training data* for the AI. Human intellectual effort may be involved in this stage in selecting and possibly also categorising the input data. The second step is *generation of the work*. Here, an AI system may generate a work with the help of instructions provided by a human, or create the work itself. The final phase is *quality assurance and delivery of the completed work*. A human may get involved in checking and/or delivering the final product to the end-user.¹¹⁸

If human involvement is confined to selecting and categorising data, the final work may not be considered to merit protection since it does not entail a human creator's independent creative effort. In contrast, when independent human intellectual effort is provided to lead the AI system through the second step in the production process, this would be enough to prove that the work is the outcome of creative process. Lastly, human labour such as element selection, digital manipulation, the use of filters and similar human actions at the final step, might meet the creativity standards for copyright protection in this view.¹¹⁹ In sum, only works in which a human being has made a significant contribution to the creation

¹¹² *Feist* (n 9), 345: 'Original, as the term is used in copyright, means only that the work was independently created by the author (as opposed to copied from other works), and that it possesses at least some minimal degree of creativity'.

¹¹³ Anna Shtefan, 'Creativity and Artificial Intelligence: A View from the Perspective of Copyright' (2021) 16 *Journal of Intellectual Property Law & Practice* 720, 721.

¹¹⁴ *ibid.*

¹¹⁵ *ibid* 723.

¹¹⁶ *Feist* (n 9) 345.

¹¹⁷ Niloufer Selvadurai and Rita Matulionyte, 'Reconsidering Creativity: Copyright Protection for Works Generated Using Artificial Intelligence' (2020) 15 *Journal of Intellectual Property Law & Practice* 536, 538–9.

¹¹⁸ *ibid.*

¹¹⁹ Selvadurai and Matulionyte (n 117) 538–39.

process should be protected by copyright.¹²⁰

One might think that AI systems make decisions through a creative process, whether human intellectual effort is involved or not. Why cannot those choices be considered creative? Because to be creative, in this view of creativity, decisions should not be too confined, e.g. governed by efficiency, functionality, external standards or practices.¹²¹ Besides, most copyright systems require human labour to have been invested in creating a work,¹²² and AI conception and execution may not meet the requirements for creativity and authorship. Although their outputs may look ‘creative’ and even artistically comparable to works created by humans, current machines are primarily composed of human-designed processes that perform certain operations.¹²³ They are constrained by encoded functions and unable to execute operations not specified in their programming code.¹²⁴ By analysing and comparing particular data, the computer executes algorithmic computations and produces a decision that results in text, graphics, music and other outputs.¹²⁵ This action depends on works already created or other data, as AI is incapable of creating outputs without data to draw on.¹²⁶ It is unable to think or invent. It can only make choices based on the data it already has access to.¹²⁷

However, the idea of protecting creative process without any outcome seems less than ideal since copyright needs an expression of an idea fixed in tangible medium. An expression obviously cannot occur spontaneously; it is always preceded by human creative activity. A person can work hard to make something, but nothing is copyrightable without an outcome. As a result, the ‘creativity is a process’ perspective does not meet current requirements for copyright, as it only addresses the preconditions for the creation of a work that may merit legal protection, not the work itself. At present, the law seems to consider creativity in copyright as a result of a symbiotic relationship between process and outcome, with an emphasis on outcome.

3.2. TOOLS CANNOT BE CREATIVE

The other main argument in favour of creativity as a human faculty is the idea that machines are just tools for human use.¹²⁸ Anything created by artificial intelligence is the outcome of synthesising data after analysis. Although AI is improving and getting more

¹²⁰ According to Miller, there is a human being ‘behind every robot’ because machines are developed, programmed and directed by human beings. See Arthur R Miller, ‘Copyright Protection for Computer Programs, Databases, and Computer-Generated Works: Is Anything New Since CONTU’ (1993) 106 *Harvard Law Review* 977, 1045.

¹²¹ *Feist* (n 9) 345.

¹²² *ibid* 359–60. The *Infopaq* and *Painer* decisions imply a human creativity: see M. De Cock Buning, ‘Autonomous Intelligent Systems as Creative Agents under the EU Framework for Intellectual Property’ (2016) *European Journal of Risk Regulation* 310, 314.

¹²³ *Shtefan* (n 113) 727.

¹²⁴ *ibid*.

¹²⁵ *ibid*.

¹²⁶ *ibid*.

¹²⁷ *ibid* 727.

¹²⁸ Miller (n 120).

complex in its operation and ability to mimic human brain functions, its activity is considered to be entirely mechanical, and so unlike human creativity in several respects.¹²⁹ While a person may develop a work from start to finish without employing a template or a sample, a machine is incapable of executing tasks comparable to such fundamental human creativity. In the absence of comparator data, it is unable to generate an output. Besides, an AI can only produce works that its programme code can envisage. Its ability to generate work of its own choosing is limited and it cannot produce something that does not come with built-in coding. Moreover, a person might pick a field of creativity without previous instruction, for purely internal reasons. Conversely, for AI to generate a distinct type of output, new computer code must first be written.¹³⁰

All of these indicate that an AI's creative process is purely mechanical. The AI, like a camera or a typewriter, is a tool that can only work when it is triggered, either directly or indirectly, by a human. When activated, it is only capable of doing the tasks that have been assigned to it in the way they have been assigned.¹³¹ For these reasons, it is argued that no machine can be creative in itself and any output of an AI that appears creative should be directly attributed to the programmers who developed and train it, or to the users who run it.¹³² People who programme, train or use an AI may be surprised by the machine doing something they did not expect, but that does not mean that the machine is able to make the creative choices required by copyright law.¹³³

Besides, it may be argued that even though today's computers have significantly more memory and processing capacity than their forerunners, they still rely on people to set the rules by which they operate. As with the photographer behind the camera, every artificially intelligent machine is backed by an intelligent programmer or team of programmers. People make rules, and machines obey them. The creator of the machine may develop a complicated network of code instructing it to analyse a data set, 'learn' patterns and then use those patterns to generate outputs.¹³⁴ However, even if the final product is singular and appears random, it is a direct outcome of the machine's process, which was in turn created by some human creator or user.¹³⁵

Therefore, according to this view, a work created by an AI represents the programmer's original intellectual conception because it can be imagined and generated within the confines of the programmer's creative space; and this occurs because the programmer is frequently able to impose sufficient constraints and limits on both the final user's and the machine's creative action.¹³⁶ In other words, the programmer creates the critical algorithm(s)

¹²⁹ Shtefan (n 113) 727.

¹³⁰ *ibid.*

¹³¹ National Commission on New Technological Uses of Copyrighted Works, Final Report (n 141).

¹³² Miller (n 120) 1045.

¹³³ Ginsburg and Budiardjo (n 3) 398.

¹³⁴ *ibid.* 402.

¹³⁵ *ibid.*

¹³⁶ Samantha Hedrick, 'I Think, Therefore I Create', (2019) 8 NYU J. Intell. Prop. & Ent. L. 324, 346. See also Dan Rosen, 'A Common Law for the Ages of Intellectual Property', (1984) 38 U. Miami L. Rev. 769, 803–4.

and makes creative choices in picking the model and preparing the parameter, selecting and allocating data, deciding and double-checking other processes such as monitoring and modifying an algorithm once it come into operation. As a result, it is argued in the context of artificial intelligence that programmers are the ‘authors’ that generate programmes as a tool for creative humans,¹³⁷ and that people who build programmes that create art are the authors of the art their programmes create.¹³⁸

Others claim that the programmer or designer of a machine makes decisions about how the machine should be used, but it is the user who actually initiates the production of the final output.¹³⁹ According to this idea, programmers generate just the ‘potential for a creation’, not the actual creation.¹⁴⁰ In this perspective, programs and machines are seen as tools that help users create works.¹⁴¹ The user often sets the parameters and provides the data for the algorithm, which can significantly affect the final result and, in some cases, the user may even influence how the algorithm operates.¹⁴² Additionally, the same program can produce different sets of output when used by different people, depending on the creative choices made by each user, which supports the idea that users have a more direct connection to the generation of the final output.¹⁴³ Either way, whether the creator is considered a programmer or an end-user does not change the idea that the machine is a tool.

Even though the UK’s case stands out in comparison to others by providing copyright protection to computer-generated works in the CDPA 1988, it does not entirely eliminate the human element; instead, it relocates it to a different stage of the creation process: ‘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.’¹⁴⁴ Although the human element does not really conduct the cognitive process of creation, (s)he nonetheless presses the enter button or offers the necessary input. As a result, it can be claimed that the generative machine was a tool and the human who made the arrangements may be considered the creator of the work.¹⁴⁵

One of the primary justifications for these arguments is the requirement for originality in creative works, which must be specific to the individual work rather than a general capa-

¹³⁷ Annemarie Bridy, ‘The Evolution of Authorship’ (2016) 39 *Colum. J. L. & Arts* 395.

¹³⁸ Pamela Samuelson, ‘Allocating Ownership Rights in Computer-Generated Works’ (1985–6) 47 *U. Pitt. L. Rev.* 1185, 1205.

¹³⁹ ‘The pragmatic answer to the AI authorship puzzle is the user who is responsible for generating the outputs’: Pamela Samuelson, ‘AI Authorship?’ (2020) 63 *Communications of the ACM* 20, 22; Shlomit Yanisky-Ravid, ‘Generating Rembrandt: Artificial Intelligence, Copyright, and Accountability in the 3a Era—the Human-Like Authors Are already Here—a New Model’, (2017) *Mich. St. L. Rev.* 659, 725. See also, National Commission on New Technological Uses of Copyrighted Works, Final Report (1979).

¹⁴⁰ Samuelson (n 138) 1209.

¹⁴¹ *ibid.*

¹⁴² Hedrick (n 136) 344–6.

¹⁴³ *ibid.*

¹⁴⁴ CDPA Section 9(3).

¹⁴⁵ Jesus Manuel Niebla Zatarain, ‘The Role of Automated Technology in the Creation of Copyright Works: The Challenges of Artificial Intelligence’ (2017) 31 *International Review of Law, Computers & Technology* 91, 97.

bility. In other words, the issue is not whether a particular artificial intelligence machine can produce works that resemble original creations in general, but rather whether it can make the necessary decisions to produce a specific creation that is deemed an original work of authorship.¹⁴⁶ Commentators not accepting AI creativity say the choices included in the machine's output are made by human programmers or end-users and not by the AI, so may be considered creative; the production may be protected as a human work and these choices make the AI a tool.¹⁴⁷

It is true that by integrating aspects of randomness into their processing, AIs may be programmed to produce unexpected outcomes.¹⁴⁸ If unpredictability is a surrogate for creativity, then instructing computers to make some choices unpredictably may be enough to constitute creativity. However, some authors argue that just programming AIs to generate disorder or break the rules would never be sufficient to make machines genuinely creative, as creativity is believed to require human consciousness.¹⁴⁹ From this perspective artificial intelligence creativity will always be an oxymoron, and no substitute for genuine creativity will ever exist.¹⁵⁰

It is also argued that the progress of advanced AIs via the use of machine learning techniques such as 'deep learning' does not alter this conclusion.¹⁵¹ Learning models are meant to seek patterns in data, experiment with alternative procedural pathways, generate general pattern-based principles and apply these to enhance their capacity to complete specific tasks like producing artworks.¹⁵² In other words, the machine is fundamentally self-programming. Instead of designing machines with carefully designed processes, the developers of these AIs frequently prioritise accuracy over explainability, programming the machines to develop their own processes and generalisations in ways that rapidly become too complex and multi-dimensional for human programmers to comprehend.¹⁵³ This leads to the 'black-box dilemma', a term used by certain AI researchers to describe how the algorithms' models become 'so complicated' that 'even the algorithm's creators have little understanding of just how or why the created model' may be so accurate at doing its tasks.¹⁵⁴ However, it is argued that 'deep learning' models that are neither exactly intelligible nor supervised (as opposed to fully coded and interpretable 'expert systems') do not alter the conclusion that AIs are just tools for humans and cannot be 'creative', because the AI is still controlled by

¹⁴⁶ Gervais (n 3) 2098.

¹⁴⁷ *ibid.*

¹⁴⁸ See Ben Goertzel, *The Structure Of Intelligence: A New Mathematical Model Of Mind* (Springer, 1993), 12. See also David Levy, *Robots Unlimited: Life In A Virtual Age* (AK Peters/CRC Press, 2019) 150–51.

¹⁴⁹ Selmer Bringsjord and David A Ferrucci, *Artificial Intelligence And Literary Creativity: Inside The Mind Of Brutus, A Storytelling Machine* (Psychology Press, 2000) xxvi.

¹⁵⁰ See John R. Searle, 'Minds, Brains, and Programs', (1980) 3 Behavioral & Brain Sciences 417.

¹⁵¹ Ginsburg and Budiardjo (n 3) 405.

¹⁵² Michael L. Rich, 'Machine Learning, Automated Suspicion Algorithms, and the Fourth Amendment', 164 U. Pa. L. Rev. 871, 886 (2016).

¹⁵³ Will Knight, 'The Dark Secret at the Heart of AI', MIT tech. Rev., Apr. 11, 2017, <https://www.technologyreview.com/s/604087/the-dark-secret-at-the-heart-of-ai/> [perma.cc/3QV2-LZQJ].

¹⁵⁴ Rich (n 152) 886.

its programmers, who decide what the machine should do (define problems for it), what it should look for (input parameters and output variables), how it should try to improve itself (its ‘loss function’) and when it should start working.¹⁵⁵

For these reasons, it is argued that AIs are only tools for their programmers or users and the author may control a tool without understanding or being able to explain what it does.¹⁵⁶ Concerns about AI creativity may be best addressed by looking at the long-standing copyright position on tools, which disregards the generative function of technologies like cameras and recognises the authorship claims of the human ‘masterminds’ who stand behind them.¹⁵⁷ The underlying premise behind the ‘mastermind’ idea of authorship is acknowledgement that an author may ‘outsource’ execution to a machine or another person and yet retain her authorship so long as she retains primary control over the process in question.¹⁵⁸ A principal/exclusive author’s authorship is unaffected even where an agent/amanuensis physically executes the creative process on the principal’s behalf since the principal has defined responsibilities for the agent in ‘specific detail’¹⁵⁹ and exercised a ‘high degree of control’ over the process of creation.¹⁶⁰ It is only when the agent or tool begins a ‘frolic of [her/its] own’, operating totally without the influence of the principal author, that she/it is recognised as an author.¹⁶¹

Overall, it can be argued that every action, step or calculation performed by AI ultimately has a human origin, whether the originator is the programmer or the end-user. AI systems that are designed and utilised by humans can be considered extensions of their creators and users, as they are unable to deviate from the instructions they have been given and therefore require supervision. As a result, AI can be viewed as the perfect tool for humans since it lacks the ability to engage in independent actions or create original works.

3.3. NO PERSONALITY, NO CREATIVITY

While it is unknown at what level of technological sophistication a machine will be capable of embarking on a ‘frolic of its own’ and producing work ‘entirely without’ the instructions of a human programmer, it is argued that today’s machines, and those of foreseeable futures, are completely subservient to the humans who define their instructions and tasks,¹⁶² because machines do not have the ability to think creatively like humans. They only seek to identify particular characteristics prior to processing them in order to generate new

¹⁵⁵ See David Lehr and Paul Ohm, ‘What Legal Scholars Should Learn About Machine Learning’, (2017) 51 U.C. Davis L. Rev. 653.

¹⁵⁶ Miller (n 120) 1045.

¹⁵⁷ Ginsburg and Budiardjo (n 3). Discussion of ‘mastermind’ theory can be found in Sections I.A and I.B.

¹⁵⁸ James Grimmelman, ‘There’s No Such Thing as a Computer-Authored Work- And It’s a Good Thing, Too’ (2016) 39 Columbia Journal of Law & the Arts 403, 408.

¹⁵⁹ See *Andrien v. S. Ocean Cty. Chamber of Commerce*, 927 F.2nd 132, 135 (3rd Cir. 1991).

¹⁶⁰ *Lindsay v. The Wrecked and Abandoned Vessel R.M.S. Titanic*, 1999 WL 816163, at *4–5 (SDNY, 13 October 1999).

¹⁶¹ Ginsburg and Budiardjo (n 3) 398.

¹⁶² *ibid.*

works.¹⁶³ Without understanding precisely what their role is in the replication of creativity, AIs just search for features that will enable them to engage with a piece of work. They are unaware of what they are doing and have no internal comprehension of it.¹⁶⁴ Machines do not catch the *Zeitgeist*, analyse social and cultural perceptions, or become subconsciously inspired.¹⁶⁵ Artificial neural networks (ANNs) mimic the functions of human consciousness, yet AI will never be able to experience emotions or the urge to express itself.¹⁶⁶ Individuals have a spiritual world, ambitions, sentiments and experiences that they express via creativity; each work has the author's unique mental and emotional input, which represents their personality.¹⁶⁷ While a machine can execute orders, only a human being can be inspired, comprehend, realise and develop ideas and bring them to life.¹⁶⁸

It is believed that these are critical factors in determining whether a work is a result of creative processes under copyright law.¹⁶⁹ As well as originality, creativity demands a meaningful goal, some level of knowledge, a degree of judgement and a capacity to evaluate the situation in which one finds oneself.¹⁷⁰ Additionally, the author's personal experiences and characteristics have an effect on their creative output.¹⁷¹ These abilities are still beyond the reach of machines. Because AIs are incapable of thinking spontaneously or mimicking improvised cognitive processes, they fall outside the legal definition of creator. Besides, it is argued that the capacity of AI technology to surprise audiences, even those who designed and trained the AI, should not imply that it could be creative, because copyright still safeguards the human being's status as the only creature capable of meeting the cognitive qualifications required to be labelled a 'creator' (in the strict sense).¹⁷² To authors holding this view, whether seen as a natural right or as an economic incentive, a creation of the human intellect has always been at the heart of copyright policy.¹⁷³ Consequently, to be considered creative and gain copyright protection, there must be a significant element of human personality in the production process.

In conclusion, according to authors who deny AI creativity, creation meriting copyright serves two purposes: the author's desire for personal expression,¹⁷⁴ and the needs of other

¹⁶³ Nycum, 'Legal Protection for Computer Programs', I Computer/Law J. 1, 11-12 (1978).

¹⁶⁴ Yanisky-Ravid (n 139) 724.

¹⁶⁵ Patrick Zurth, 'A Case Against Copyright Protection for AI-Generated Works', (2021) 25 UCLA Journal of Law & Technology 20, 11.

¹⁶⁶ Shtefan (n 113).

¹⁶⁷ *ibid.*

¹⁶⁸ *ibid* 727-8.

¹⁶⁹ See *Feist* (n 9).

¹⁷⁰ Madeleine de Cock Buning, 'Autonomous Intelligent Systems as Creative Agents under the EU Framework for Intellectual Property' (2016) 7 European Journal of Risk Regulation 310, 316.

¹⁷¹ Zurth (n 165) 12.

¹⁷² Zatarain (n 145) 98.

¹⁷³ Gervais (n 3) 2079.

¹⁷⁴ Chapter 1 (Works), note 7 to Art. 1.1.(1), 'Wittem International Network Project on a European Copyright Code' (IVIR) <<https://www.ivir.nl/copyrightcode/european-copyright-code/>> accessed 25 December 2022."plainCitation": "Wittem International Network Project on a European Copyright Code' (IVIR

individuals seeking cultural, aesthetic, spiritual or further growth via art.¹⁷⁵ Anyone who has created anything has a strong interest in that work, regardless of who inspired them to do so or what aim they sought to accomplish with it. The nature of AI production, on the other hand, is distinct from human creativity. AI activity does not even attempt to replicate human creativity since it is not motivated by the factors that drive humans to create. AIs create items just to pique the attention of particular individuals, having no interest in or necessity for this activity. They operate on fundamentally different principles and are wholly mechanical in nature. They only exist to meet particular human demands, such as those of a programmer or a user, and hence serve as a tool in the hands of humans. Each item formed by AIs is entirely the consequence of algorithmic, calculation-based decisions. As a result, the items obtained in this manner cannot be deemed works of creativity, even if they are of tremendous societal worth. As long as computers do not have the ability to think, feel or express themselves, creativity will remain a human trait.

4. A HUMAN IS A CREATIVE MACHINE AND CREATIVITY CAN BE CODED

As mentioned before, to be protected by EU copyright law a work needs to demonstrate the personality of the author in the process of creating the final product,¹⁷⁶ and a work produced without ‘any creative input or intervention from a human author’ is not protected by the US Copyright Office.¹⁷⁷ Both US and EU case law presume that authorship is synonymous with human authorship. Requiring a bit more than mere skill, labour and judgement indicates that human creativity is also a condition for copyright protection in the UK.¹⁷⁸ To assert that authorship must be human may not impose a condition favouring human-produced products over machine-made ones; instead, it may assert that human communication is central to creativity as a social activity.

Initially, creativity was a way for humans to communicate.¹⁷⁹ Later, communication from a human to a machine became considered a creative act and copyright protection was provided to computer software as literary works, because the inclusion of a set of human expressions in a program written for a machine to complete a task implies that the machine’s execution of that program might transmit that expression to human users.¹⁸⁰ Now, we are witnessing a third, unprecedented situation in which a machine communicates with humans by creating works independently without any human intervention.¹⁸¹ To decide whether there is a communication meriting copyright protection in this case, the term ‘creativity’ in copyright law needs to be revisited and reshaped comprehensively.

People, as they have always been, are already creative machines, learning from previously

¹⁷⁵ Shtefan (n 113) 728.

¹⁷⁶ See *Infopaq* (n 11); *Painer* (n 74) [89], Opinion of AG Trstenjak.

¹⁷⁷ USCO, *Compendium*, § 101 313.2;

¹⁷⁸ See Section 2.3.

¹⁷⁹ Gervais (n 3) 2085; Carys Craig and Ian Kerr, ‘The Death of the AI Author’ (2020) 52 *Ottawa L. Rev.* 31.

¹⁸⁰ Gervais (n 3) 2085. See also, See Dan L. Burk, ‘Patenting Speech’, (2000) 79 *Tex. L. Rev.* 99, 127.

¹⁸¹ Gervais (n 3), 2085, Bridy (n 3), 12.

created works and analysing them, extrapolating principles from their precedents and then applying those laws to the work of composition.¹⁸² Does human creativity really take place within the framework of certain rules and methods? Can it be precisely defined, and be computational or algorithmic? Humans and machines may not be as dissimilar as we are conditioned to assume when we examine the rule-bound nature of their respective outputs and the existing models they often emulate.¹⁸³ Maybe it is time to look at how humanisation of the author figure stops us from facing both the rule-based nature of human creativity and the potential unruliness of machine production.¹⁸⁴ As explained in section 1 of this article, human authors are required to demonstrate little creativity in order to be protected by copyright law. Besides, with the recent advancement in machine learning and AI technology, it is increasingly impossible to tell whether a work was created by a person or generated procedurally by a computer code. Accordingly, when it comes to creativity for copyright protection, it is now time to consider whether it makes sense to require more from machines than from humans.

The question whether AI systems will ever be creative in the same way that humans are creative is hotly debated. The answer is almost completely determined by how creativity is defined. What is the best way to describe creativity? One new idea might be creative and merit copyright protection, while another is not. What is the difference between the two? Unpredictability is a feature of creative ideas. They even seem to be improbable at times, yet they do occur. How is it possible to be creative? If creativity is considered as a distinctively human ability, then no matter how advanced AI systems get, they will never be able to accomplish it *ex vi termini*.¹⁸⁵ This is one of the main arguments deployed by legislation, courts and commentators against AI creativity, as surveyed in section 2 of this article. However, if it is characterised as a combination of features or behaviours, it may be coded.

Although competing definitions can be found in psychology, philosophy and neuroscience literature, legislations and courts require minimal standards for creativity in return for copyright protection and avoid providing a clear definition for the term. Without a doubt, courts are aware that creativity entails more than choosing between two alternatives. Although they employ terms like ‘true artistic skill’,¹⁸⁶ ‘intellectual invention’,¹⁸⁷ ‘creative judgment’,¹⁸⁸ ‘intellectual production’,¹⁸⁹ and ‘intellectual conception’,¹⁹⁰ to characterise

¹⁸² Italo Calvino, *The Uses of Literature: Essays* (Houghton Mifflin Harcourt 1987) 15.

¹⁸³ See Alison James, ‘Automatism, Arbitrariness, and the Oulipian Author’, 31 *French Forum* 111, at 122 (2006) (arguing that Calvino ‘divides the process of creation into mechanical and human components, suggesting that the author... can work both with and against the automatism of the machine’).

¹⁸⁴ See Bridy (n 3).

¹⁸⁵ See Roger Schank & Christopher Owens, *The Mechanics of Creativity*, in *The Age of Intelligent Machines* 394 (Raymond Kurzweil ed., 1991), 394 (arguing that that machines can never truly be creative because creativity is fundamentally mysterious and cannot be reduced to rules and procedures.)

¹⁸⁶ *L. Batlin & Son, Inc. v. Snyder*, 536 F.2d 486, 491 (2nd Cir. 1976).

¹⁸⁷ *Burrow-Giles* (n 22) 59.

¹⁸⁸ *Rogers v. Koons*, 960 F.2d 301, 304 (2nd Cir. 1992).

¹⁸⁹ *Feist* (n 9) 347.

¹⁹⁰ *Burrow-Giles* (n 22) 59.

creativity,¹⁹¹ they make every effort to avoid examination of the creativity criterion in detail, finding quickly that the bare minimum amount of required creativity exists and then moving on to other legal matters. They are also extraordinarily generous in their assessment of the creative value of works that are the result of even a small number of intellectual decisions. It does not matter whether a work is completely conventional or entirely accident-driven; it gets copyright protection from the courts.¹⁹²

In legally establishing a creativity barrier for copyright protection, the Supreme Court of the US, for instance, stated that the work must ‘entail a minimal degree of creativity’.¹⁹³ According to the Court, ‘the requisite level of creativity is extremely low; even a slight amount will suffice. The 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.’¹⁹⁴ According to EU case law, anything produced by a human expressing creative ability in generating the work by making free and creative choices seems enough.¹⁹⁵ To be considered creative under UK copyright law, the work must be created independently by the author’s own skill, mental labour or judgement and not simply copied.¹⁹⁶ There is a point at which an individual’s endeavour to create is not sufficiently creative to deserve copyright protection, but this point is simply the ‘narrowest and most obvious limits’.¹⁹⁷

Even rigorous copyright law is extraordinarily generous in the assessment of the creative value of works deserving of copyright protection; the assumption behind such law, particularly in the United States and the European Union, is that creativity meriting copyright protection is a human trait. Not only does copyright law look at the work produced to determine the level of creativity, but it also looks at the creator’s contribution to the work of art; was there a reasonable amount of human creative effort and was it the author’s own intellectual creation? As a result, if the generator of the work is devoid of human creativity, it is most likely incapable of creating copyrightable works. In this context, it is possible to assess the creativity by looking at creators, creation itself or the process of creation. What makes a creation original is not being a copy; and the creative process itself. And a person who creates a work that is not a copy, meriting copyright protection as a result of the creative process, is defined as a creator. There is a reasonable number of decisions and arguments that can be found in case law and literature regarding the characteristics of a ‘creator’ and the creative conditions for a work to be protected by copyright.¹⁹⁸ However, without disregarding the importance of the other two, the key factor in the assessment of copyright protectability is the process of creation since it is a bridge between the creator and the crea-

¹⁹¹ Mark Bartholomew, ‘Copyright and the Creative Process’ (2021) 97 *Notre Dame Law Review* 61.

¹⁹² *Bell v. Catalda*, 105: ‘[h]aving hit upon... a variation unintentionally, the “author” may adopt it as his and copy-right it’; *Time Inc. v. Bernard Geis Assocs*, 293 F. Supp. 130, 143 (SDNY 1968).

¹⁹³ *Feist* (n 9) 348-50.

¹⁹⁴ *ibid.*

¹⁹⁵ *Painer* (n 74) [89].

¹⁹⁶ See *University London Press* (n 82).

¹⁹⁷ See *Bell v. Catalda*, 105; *Time v. Geis*, 143.

¹⁹⁸ See Sections 2 and 3.

tion, and it directly impacts both. Nevertheless, with the recent developments in generative artificial intelligence, the legal boundaries of creativity in the context of copyright law do not adequately take into account philosophical, psychological and neuroscientific theories and studies, which causes inconsistency regarding copyright authorship. To be future-proof, the creativity concept in copyright law needs to be comprehensively reconsidered in the context of these theories and research, as this section aims.

4.1. PSYCHOLOGICAL VIEW

The dominant theories of the creation process in psychology see creativity mainly as (1) problem-solving process,¹⁹⁹ (2) problem-finding process,²⁰⁰ (3) cognitive process²⁰¹ and (4) componential process.²⁰²

Following this categorisation, the creative process is distinguished by the presence of ill-defined goals and problems, in contrast to traditional problem-solving, where the problem is understood but the solution is not.²⁰³ While there may be instances where there is no clear problem to be solved, it is often possible to break down poorly defined problems into more clearly defined subproblems that can be approached using traditional problem-solving methods.²⁰⁴ This theory places equal emphasis on both the creative process and the individual engaged in it, with the former receiving attention because it is concerned with standard cognitive psychology methods such as ‘problem representation’ and ‘heuristic searching’, and the latter receiving attention because of the emphasis placed on the author’s need for domain-specific knowledge.²⁰⁵ This approach sees creativity occurring in three main, recursive stages.²⁰⁶ The first is a filtering stage, in which the author’s attention is focused on a particular input.²⁰⁷ In the following stage, cognition, the author works out what the problem is and how to describe it.²⁰⁸ At this point, the author’s cognition is receptive to extra environmental inputs.²⁰⁹ The subsequent phase is production, when prospective solutions to the problem are generated.²¹⁰ Then, a new cycle of the phases of cognition and production emerges; new information is learned and new possible approaches are developed.²¹¹

¹⁹⁹ Aaron Kozbelt, Ronald A Beghetto and Mark A Runco, ‘Theories of Creativity’ in James C Kaufman and Robert J Sternberg (eds), *The Cambridge Handbook of Creativity* (Cambridge University Press 2010) 33 <<https://www.cambridge.org/core/books/cambridge-handbook-of-creativity/theories-of-creativity/D114418F37F6C5DFB13C-BA5557ED197F>> accessed 26 December 2022.

²⁰⁰ *ibid.* See also Jacob W Getzels and Mihaly Csikszentmihalyi, *The Creative Vision: A Longitudinal Study of Problem Finding in Art* (John Wiley & Sons 1976).

²⁰¹ Kozbelt, Beghetto and Runco (n 199) 31.

²⁰² G Wallas, *The Art of Thought* (Harcourt, Brace 1926) <<https://books.google.co.uk/books?id=ZIF9AAAAMAAJ>>.

²⁰³ Kozbelt, Beghetto and Runco (n 199) 33.

²⁰⁴ *ibid.*

²⁰⁵ *ibid.*

²⁰⁶ Joy Paul Guilford, *The Nature of Human Intelligence* (McGraw-Hill Inc., US 1967) 313–16.

²⁰⁷ *ibid.*

²⁰⁸ *ibid.*

²⁰⁹ *ibid.*

²¹⁰ *ibid.* 313–16.

²¹¹ *ibid.*

This cycle concludes when one possible approach proves well matched with the underlying problem.²¹² There is an intermediate, evaluative step between each of these phases, during which the author verifies the accuracy of the input, the structure of the problem and potential solutions.²¹³ The author's stored memory, including visual-figural, symbolic, semantic and behavioural information, serves as the basis for the entire process and feeds each of the these phases.²¹⁴

However, as a response to the problem-solving approach to creativity, which does not adequately explain how authors identify problems and begin the actions necessary to facilitate problem solving, some argue that identifying the problem is an essential initial stage in the problem-solving process, and is not necessarily independent of the solution itself.²¹⁵

Seeing creativity as a cognitive process, which is divided into divergent and convergent thinking, is another approach.²¹⁶ Divergent thinking is unfocused, associative thinking that goes in different directions and could lead to an original idea that is useful for the task at hand.²¹⁷ In contrast, convergent thinking happens when cognition seeks an accurate, useful and useable answer that conforms to task-relevant rules, primarily through deduction.²¹⁸ In this context, creativity is defined as the capacity to repackage previously absorbed ideas in order to solve novel problems.²¹⁹ To do that, there is extensive utilisation of stored memory,²²⁰ which has an impact on the creative result, and a high level of intellect and cognitive inhibition must be present to manipulate previously absorbed material efficiently.

The fourth approach to creativity in psychology as a componential process is defined by Wallas four main phases: preparation, incubation, illumination and verification.²²¹ Amabile developed his approach on the basis of Wallas' stage theory and defined this stages as presentation, preparation, response generation and response validation.²²² The presentation of the task or problem is the first phase.²²³ This phase occurs when the author is motivated to recognise a problem or complete a task, or when an outside source presents the task or problem.²²⁴ The second phase, preparation, consists of the author constructing or activating a knowledge database that is specific to the work at hand.²²⁵ This phase may be greatly

²¹² *ibid.*

²¹³ *ibid.*

²¹⁴ *ibid.*

²¹⁵ Getzels and Csikszentmihalyi (n 200) 89–106.

²¹⁶ Kozbelt, Beghetto and Runco (n 199) 31; Guilford (n 206) 138.

²¹⁷ Guilford (n 206) 138.

²¹⁸ *ibid.* 171.

²¹⁹ Divya Sadana and others, 'The Neuropsychology of Creativity: A Profile of Indian Artists.' (2017) 15 *Acta Neuropsychologica* 145.

²²⁰ Guilford (n 206) 313–15.

²²¹ Wallas (n 202) 80.

²²² T Amabile, *Creativity In Context: Update To The Social Psychology Of Creativity* (Avalon Publishing 1996), 95.

²²³ *ibid.*

²²⁴ *ibid.*

²²⁵ *ibid.*

accelerated when the author has adequate task-relevant knowledge and experience.²²⁶ The third phase is response generation, during which the author produces potential answers to the task or problem by exploring consciously or subconsciously for potential routes to a solution.²²⁷ Response validation is the fourth phase, during which knowledge and abilities relevant to the task play a key role.²²⁸ At this stage, the possible answers to the problem(s) defined in the first phase are analysed using what is already known and put together in a way that fits the problem(s) satisfactorily and works.²²⁹

Each phase also involves three cognitive components: domain-relevant skills, creativity-relevant abilities and task motivation.²³⁰ Domain-relevant skills contain all responses the author can perceive.²³¹ From this pool of potential responses, a new response is developed and then confirmed using task-relevant information and expertise.²³² The author's previous factual knowledge of the task domain, which comprises facts, principles, paradigms, aesthetic standards and the technical skills required for the task, forms part of this component.²³³ The manner in which task-relevant knowledge is saved and coded is of critical relevance; material coded by general principles will be more beneficial to the author than a collection of facts with limited application.²³⁴ This component can be found as mostly occurring during the phases of preparation and response validation.²³⁵

The 'something extra' needed for creative activity is referred to as creativity-related skills.²³⁶ The extent to which the new concept improves upon its predecessors is determined by this component.²³⁷ Even the most talented authors are unlikely to create something new if they lack the creativity-related skills to do so.²³⁸ This component involves the ability to transcend established ways of thinking, to devise novel cognitive systems for solving problems, to comprehend complex situations, to maintain a diverse array of potential responses over time, to temporarily set aside the need for response validation, to utilise the broadest categories possible, to have a highly accurate memory and to possess the capacity for creative conception of works in the world.²³⁹ This component is related to the generation of responses.²⁴⁰

²²⁶ *ibid.*

²²⁷ *ibid* 55–6.

²²⁸ *ibid* 96.

²²⁹ *ibid.*

²³⁰ Teresa M Amabile, 'A Model of Creativity and Innovation in Organizations' (1988) 10 *Research in Organizational Behavior* 123, 137; Åke E Andersson and Nils-Eric Sahlin, *The Complexity of Creativity* (Springer 2011) 118.

²³¹ Amabile (n 222) 85.

²³² *ibid.*

²³³ Amabile (n 230) 139.

²³⁴ *ibid.*

²³⁵ *ibid.*

²³⁶ Amabile (n 222) 86.

²³⁷ *ibid.*

²³⁸ *ibid* 88–9.

²³⁹ *ibid.*

²⁴⁰ *ibid* 94.

Task motivation may be internal (the author's interest in a particular activity) and/or external (a social or professional limitation that obliges the author to participate in a specific task).²⁴¹ Unlike internal motivation, external motivation restricts the author's creative abilities.²⁴² The task motivation component influences both task presentation and response validation.²⁴³

According to all four theories, previous knowledge includes a variety of types of information that might serve as the foundation for a work of authorship.²⁴⁴ Previous knowledge includes both ideas (in their legal sense) and more abstract elements, such as techniques and procedures, that are central to the creative process.²⁴⁵ These theories also recognise the role of knowledge components that reflect tangible and explicit expressions (in the legal context) derived from works that are retained in the author's memory in determining the relevance of knowledge to the task at hand.²⁴⁶ Cognitive psychology sees both sorts of knowledge as possible bases for creative action.²⁴⁷ Under copyright law, the 'previous knowledge' used in the first stages of the creative process may be any sort of knowledge that the theories take into account, such as the preparation and response creation phases of the componential process theory. Copyright law only concerns itself with the final outcome of the creative process, rather than the early stages of creation. This focus on the output means that copyright law allows for the use of ideas or unprotected expressions as the basis for creativity in the final product, but prohibits the use of copyrighted expressions, with certain exceptions (such as the doctrine of fair use).

In all four theories, the creative process can be divided into two main subprocesses and described as follows. The first process, which all theories of creativity have in common, is an unfocused period during which the abstract ideas that will eventually lead to the creative activity are shaped.²⁴⁸ The second process, again shared by all four theories, is dependence on past, task-relevant, information and memory at various phases of the creative process.²⁴⁹ This process involves the crystallisation of disorganised thinking into a tangible, perceptible, creative result, which is mostly controlled by task-relevant knowledge and memory stored in the author's brain.²⁵⁰ While the first subprocess is relevant to the originality criterion of copyright law, which centres on the author's ability to make an original and independent contribution to the final creative result, the second subprocess is pertinent to the idea/expression dichotomy.²⁵¹

²⁴¹ Mark A. Runco & Ivonne Chand, *Cognition and Creativity* (1995) 7 *EDUC. PSYCHOL. REV.* 243, 245.

²⁴² *ibid.*

²⁴³ *ibid.*

²⁴⁴ Omri Rachum-Twaig, 'Recreating Copyright: The Cognitive Process of Creation and Copyright Law' (2016) 27 *Fordham Intell. Prop. Media & Ent. Law Journal LJ* 287, 304.

²⁴⁵ *ibid.*

²⁴⁶ *ibid.*

²⁴⁷ *ibid.* 304.

²⁴⁸ *ibid.* 319.

²⁴⁹ *ibid.*

²⁵⁰ *ibid.* 320.

²⁵¹ *ibid.*

Psychological theories mentioned in this part of the article have described the complex mechanisms that form the basis of the human creative process. These theories frequently portray it as a sophisticated interaction between problem-solving, cognitive involvement, and componential factors. They explain the process of going from a vague problem to the development of a creative solution, emphasising the need of specialised knowledge, cognitive processes, and motivation. The current progress in the field of artificial intelligence, strongly supports the inclusion of these components in AI frameworks.

Generative artificial intelligence systems exhibit proficiency in problem definition, a fundamental stage in the creative process that entails identifying or formulating a challenge to be resolved. They create comprehensive databases of task-specific information, like the 'preparation' stage of psychological models in which an individual's knowledge base is engaged. These systems can retain large quantities of data and use this information to produce new and innovative results, demonstrating their cognitive ability to creatively utilise existing knowledge.

The ability of AI systems to explore alternative solutions also reflects the cognitive processes of divergent and convergent thinking. Algorithms enable artificial intelligences to engage in divergent thinking, exploring several alternatives, and subsequently using convergent thinking to identify the most viable options. This digital cognition process aims to achieve uniqueness while adhering to task-specific standards. Besides, AI systems' ability to analyse and improve produced replies is consistent with the evaluation and verification processes described in psychological theories. Generative AI systems can evaluate their generated outputs based on a predefined set of criteria. They then refine their outputs through a process of iteration, aiming to provide solutions that are not only original but also practical and successful.

The alignment of these capabilities with contemporary AI technology implies that AI systems can not only imitate creativity but also be seen as active contributors in the creative process. AIs can exhibit the psychological aspects of creativity by successfully completing the steps of problem definition, preparation, response generation, and response validation. Under the existing frameworks of copyright law, which prioritise fixation and originality without explicitly considering the source, it is possible for generative AIs to be recognised as 'creators' from a legal standpoint. By establishing connections between the phases of the creative process as defined in human psychology and the capabilities of generative AI systems, we can fill the logical gap and support the assertion that AI has the capacity for creativity within the confines of copyright law. This not only enhances the correlation between psychological theories and the capacities of AI, but also establishes generative AI as a valid hub of creativity in the digital era.

4.2. PHILOSOPHICAL VIEW

From ideas like scientific hypotheses or jokes to objects like origami, sculpture and many more, creativity is found in almost every part of existence. It is not limited to artists and creators, but can be found in every aspect of our cognitive abilities such as conceptual thinking and memory retention skills. As a result, it is more reasonable to ask 'how creative is

that idea?’ than ‘is that idea creative?’ This will assist in appreciating the complexities of an individual’s creativity and provide insight into how they came up with unusual ideas in the first place. In this context, it is argued in philosophy that creativity is the ability to generate ideas or artefacts that are new, surprising and valuable.²⁵²

The term ‘new/novel’ has two distinct meanings in this context. The idea may be new merely to the individual or, as far as we know, in history. ‘Psychological creativity (P-creativity)’ describes the first kind of new idea generation, and ‘historical creativity (H-creativity)’ the second.²⁵³ H-creativity requires an idea to be developed for the first time in human history and not previously encountered by anybody else.²⁵⁴ It is H-creativity that matters most to historians of the arts, sciences and technology.²⁵⁵

P-creativity, on the other hand, is critical for understanding the psychology of creativity. It entails coming up with an unexpected, beneficial idea that is novel to the individual who comes up with it.²⁵⁶ The fact that an idea is brilliant but not novel does not make less creative the people who develop similar ideas later.²⁵⁷ P-creativity, which emphasises the novelty of an idea only in relation to the individual who has it, is consistent with the copyright law’s originality standard and with the requirement for independent creation rather than absolute novelty in copyright law.²⁵⁸ Work may still be deemed original under copyright law even where another author has previously produced similar work, so long as the second work does not imitate the first.²⁵⁹

Simply creating something out of nothing and coming up with ‘surprising’ new ideas seems magical at first glance. It is, however, impossible for humans because people need inputs to generate an output. By examining the many instances of human creativity that surround us, it is argued that ‘surprising’ creativity occurs in three distinct ways. Surprising ideas may only be generated by a process of ‘combination’, ‘exploration’ or ‘transformation’.²⁶⁰ Combinational creativity generates novel combinations of existing ideas through establishing linkages between previously unconnected concepts. Analogy is a kind of combinational creativity that makes use of common conceptual structure and is extensively employed in science and art.²⁶¹ Combinational creativity may occur either purposefully or unintentionally. Making a novel combination, however, requires a significant store of

²⁵² Margaret A Boden, ‘Music, Creativity, and Computers’ in Jordan BL Smith, Elaine Chew and Gérard Assayag, *Lecture Notes Series, Institute for Mathematical Sciences, National University of Singapore*, vol 32 (co-published with Imperial College Press 2016) 75 <http://www.worldscientific.com/doi/abs/10.1142/9789813140103_0005> accessed 28 February 2021.

²⁵³ Margaret A Boden, ‘Creativity and Artificial Intelligence’ (1998) 103 *Artificial intelligence* 347, 348.

²⁵⁴ *ibid.*

²⁵⁵ *ibid.*

²⁵⁶ Boden (n 252) 76.

²⁵⁷ *ibid.*

²⁵⁸ *Feist* (n 9) 345–6.

²⁵⁹ *ibid.*

²⁶⁰ Margaret A Boden, ‘Computer Models of Creativity’ [2009] *AI Magazine* 23, 23.

²⁶¹ Boden (n 260) 24–5.

information in the person's mind, as well as a variety of methods to move about inside it.²⁶² Novel combinations are valued because the ideas have some intelligible conceptual pathway between one another for the combination to 'make sense'. Therefore, combinational works which result from random matching rarely achieve value.

Exploratory creativity is based on a culturally acceptable thinking style, or 'conceptual space'.²⁶³ A collection of generative rules is used to define and confine the space. These norms are usually, perhaps always, implicit.²⁶⁴ Each work created in accordance with them will be compatible with the style in question.²⁶⁵ In exploratory creativity, the individual wanders across space, discovering what is there (including previously undiscovered locations) – and, in the most exciting circumstances, discovering both the possibilities and the limitations of the conceptual space.²⁶⁶ Exploratory creativity is a well-known and recognised vocation for many people, including scientists, painters and musicians who work within an established way of thinking and investigate its contents, bounds and possibilities, and sometimes superficially tweaking these.²⁶⁷

In transformative creativity, one or more of the distinguishing aspects of the space or style are changed (or dropped).²⁶⁸ Consequently, ideas that could not have been formed before the alteration may now be generated.²⁶⁹ This is the most exciting of the three forms of creativity, since it may generate ideas that are not just novel but fundamentally different from those that have come before. As a result, they often seem paradoxical. Humans sometimes change or remove one or more of the dimensions of a recognised conceptual space, or create a new space. Such change allows thoughts to be generated that previously were unthinkable (in that conceptual space). The more profound the alteration and/or the modified dimension, the more diverse the newly conceivable structures may be.²⁷⁰

Apart from being 'novel' and 'surprising', a work must also be 'valuable' to qualify as creative.²⁷¹ However, it is difficult to identify aesthetic standards, and much more difficult to express them in a precise manner. Because creativity, by definition, entails not just novelty (on some level) but also value, and because values vary widely, many debates regarding creativity are based on value conflicts.²⁷² For this reason, copyright law avoids evaluating the work from an aesthetic point of view while assessing its originality. The fact that a work is created outside a random or mechanical process and does not resemble another work makes its originality valuable in the context of copyright. Taking these together, processes for gene-

²⁶² Boden (n 252) 77–8.

²⁶³ Boden (n 260) 25.

²⁶⁴ *ibid.*

²⁶⁵ *ibid.*

²⁶⁶ *ibid.*

²⁶⁷ *ibid.*

²⁶⁸ Boden (n 260) 25.

²⁶⁹ *ibid.*

²⁷⁰ Boden (n 252) 80.

²⁷¹ *ibid.* 85.

²⁷² *ibid.*

rating new and surprising ideas (that constitute creativity) can be coded, which means AI can also be creative.

Within the realm of artificial intelligence, it can be argued that AI systems employ algorithms and neural networks to replicate combinational creativity by discerning patterns and connections across diverse information, resulting in unique ideas or creations that have potential value within certain settings. AI's capacity for exploratory creativity is demonstrated by its skill in operating within predetermined restrictions and producing outputs that are both consistent and innovative within those limitations. This can be seen in large language models that produce music emulating the style of a specific composer or generate artwork belonging to a specific genre. Transformative creativity in AI is demonstrated when algorithms autonomously adjust their own rules or generate whole new frameworks for problem-solving, similar to what happens in deep learning systems. This exemplifies the utmost depth of creativity, where the machine's output is not only creative and unexpected but also represents a deviation from known patterns.

Moreover, the evaluative dimension of creativity, which is essentially subjective and varies significantly among different cultures and circumstances, poses a distinct difficulty. Nevertheless, copyright law does not make aesthetic judgements. It considers originality to be determined by the originality and independence of creation, rather by its artistic worth. AI's capacity to produce outputs that are unique and non-derivative enables it to meet the criteria of originality as defined by copyright law.

AI systems demonstrate their capacity in the creative process by digitally emulating combinational, exploratory, and transformational forms of creativity, resulting in new and unexpected outputs. Hence, when contemplating the conceptual foundations of creativity, it is possible that AI demonstrates capabilities that closely resemble human creativity. This realisation expands the discussion on creativity to include artificial intelligence, indicating that AI systems can be considered as the main actor behind the creative processes within the philosophical and legal framework of the term.

4.3. NEUROSCIENTIFIC VIEW

As well as the psychological and philosophical theories, recent neuroscientific research shows that the human creative process can be objectively studied. Researchers can now study the biological characteristics of creative thought via electroencephalography (EEG), positron emission tomography (PET) and functional magnetic resonance imaging (fMRI) technologies that can show neuronal processes in real time.²⁷³ EEG detects fast changes in the brain's electric and magnetic fields.²⁷⁴ PET identifies areas of the brain with increased chemical activity by using a radioactive tracer,²⁷⁵ while fMRI measures changes in brain oxygenation and blood flow, indicating which brain areas and networks are active in response

²⁷³ Nora D Volkow, Bruce Rosen and Lars Farde, 'Imaging the Living Human Brain: Magnetic Resonance Imaging and Positron Emission Tomography' (1997) 94 *Proceedings of the National Academy of Sciences* 2787.

²⁷⁴ *ibid.*

²⁷⁵ *ibid.*

to certain stimuli.²⁷⁶

Rather than relying on self-reporting, neuroscientists assess the brain activity of individuals engaged in creative tasks to evaluate their creativity.²⁷⁷ In these tests, professionals in the relevant creative discipline independently assess the artistic works' relative creativity. The specialists' creativity ratings are regarded as legitimate if their assessments show a significant level of agreement. It is thus possible to score the outputs on a scale ranging from low to high levels of creativity and compare them to each creator's brain activity.²⁷⁸ Examining the creative process through analysis provides empirical support for the existence of mental phenomena that are beyond our conscious awareness or incapable of being articulated. As we do not possess the means to concretely define the creative process as it occurs within the human mind, neuroscientific research offers a valuable method for investigating this phenomenon.

Some of these studies find that the 'alpha' EEG frequency band is more active when people are engaged in creative thinking.²⁷⁹ One such study found that college students who were considered highly creative by their instructors exhibited stronger alpha signals during the inspiration phase of a creative writing task, whereas those who were less creative did not show this distinction.²⁸⁰ According to a more recent study, the broad alpha range may be divided into multiple subfrequencies, providing a finer-grained picture of creative ideation.²⁸¹ It has been observed that lower frequencies within this range are more often associated with general task-related needs, such as attentiveness and focus, while higher frequencies may be linked to specific task demands, such as retrieving relevant phrases or images from memory.²⁸² Other research has also identified a connection between specific types of alpha activation and an individual's subjective evaluation of their own thoughts as original.²⁸³ While these studies do not fully encompass the complexities of the creative thinking process, the consistent and reliable association between alpha frequencies and creative ideation suggests that it may be possible to objectively assess certain elements of creative thought.²⁸⁴

Neuroscience allows us to differentiate between the utilisation of internal images for

²⁷⁶ *ibid.*

²⁷⁷ Andreas Fink and others, 'Creativity Meets Neuroscience: Experimental Tasks for the Neuroscientific Study of Creative Thinking' (2007) 42 *Methods* 68, 68.

²⁷⁸ See Genevieve M. Cseh and Karl K. Jeffries, 'A Scattered CAT: A Critical Evaluation of the Consensual Assessment Technique for Creativity Research', (2019) 13 *Psych. Aesthetics, Creativity & Arts* 159, 159. This assessment method has been described as the 'gold standard' for reliable creativity research.

²⁷⁹ Mark A Runco, '*Creativity: Theories and Themes: Research, Development, and Practice*', 78 [2007] *Development and Practice*. Amsterdam: Elsevier 92.

²⁸⁰ Andreas Fink, Barbara Graif and Aljoscha C Neubauer, 'Brain Correlates Underlying Creative Thinking: EEG Alpha Activity in Professional vs. Novice Dancers' (2009) 46 *NeuroImage* 854.

²⁸¹ Andreas Fink and Mathias Benedek, 'EEG Alpha Power and Creative Ideation' (2014) 44 *Neuroscience & Biobehavioral Reviews* 111, 113.

²⁸² *ibid.*

²⁸³ Aljoscha C Neubauer and Andreas Fink, 'Intelligence and Neural Efficiency' (2009) 33 *Neuroscience & Biobehavioral Reviews* 1004, 1010.

²⁸⁴ Fink and Benedek (n 281) 119.

creative and non-creative purposes.²⁸⁵ Intuitively, people link the creative process with the generation of mental imagery.²⁸⁶ It turns out that creating such imagery is important for both visual and non-visual creativity.²⁸⁷ Although not all usage of imagery is creative, scientists believe that the brain's ability to imagine new images 'certainly represents a crucial capacity underlying creative thought'.²⁸⁸ Moreover, neuroscience indicates that the more robust the interaction between three distinct brain systems, the more creative the individual.²⁸⁹ When the connections a person makes in this neural network are assessed, their strength has a substantial correlation with how well that person scores on an originality test.²⁹⁰ As researchers have discovered, 'a person's capacity to generate original ideas can be reliably predicted from the strength of functional connectivity within this network, indicating that creative thinking ability is characterised by a distinct brain connectivity profile'.²⁹¹ These results suggest that creativity is not necessarily ineffable and that it is possible to gain insight into the creative process through objective measures such as alpha waves, mental imagery and network connections. While these measurements may not provide a complete understanding of creativity, they do offer objective evidence that can inform decisions on copyright, which have traditionally treated creativity as an enigmatic phenomenon. In this context, neuroscience has highlighted three critical variables in the creative process: motivation, domain and field.

An individual's motivation is substantially connected with creative success: in order to develop anything creative, an author must desire to make something creative.²⁹² Although courts do not examine authors' motivations, scientists researching creativity believe that motivation is a critical prerequisite for creativity.²⁹³ The deliberate pursuit of novelty is essential for creative achievement,²⁹⁴ and motivation is the most important condition for human creativity.²⁹⁵

²⁸⁵ Anna Abraham, 'Creative Thinking as Orchestrated by Semantic Processing vs. Cognitive Control Brain Networks' (2014) 8 *Frontiers in Human Neuroscience* 95, 1.

²⁸⁶ *ibid* 2.

²⁸⁷ Laura M Pidgeon and others, 'Functional Neuroimaging of Visual Creativity: A Systematic Review and Meta-analysis' (2016) 6 *Brain and Behavior* e00540, 1–2.

²⁸⁸ M Benedek, 'Internally Directed Attention in Creative Cognition' in Rex E Jung and Oshin Vartanian (eds), *The Cambridge Handbook of the Neuroscience of Creativity* (Cambridge University Press 2018), 180.

²⁸⁹ Roger E Beaty, Paul Seli and Daniel L Schacter, 'Network Neuroscience of Creative Cognition: Mapping Cognitive Mechanisms and Individual Differences in the Creative Brain' (2019) 27 *Current Opinion in Behavioral Sciences* 22, 22–4.

²⁹⁰ *ibid*.

²⁹¹ Roger E Beaty and others, 'Robust Prediction of Individual Creative Ability from Brain Functional Connectivity' (2018) 115 *Proceedings of the National Academy of Sciences* 1087, 1087.

²⁹² See Runco (n 279).

²⁹³ Carmen Fischer, Charlotte P Malycha and Ernestine Schafmann, 'The Influence of Intrinsic Motivation and Synergistic Extrinsic Motivators on Creativity and Innovation' (2019) 10 *Frontiers in Psychology* 137, 1.

²⁹⁴ Chrysikou EG, "The Costs and Benefits of Cognitive Control for Creativity" in Jung and Vartanian (eds), *The Cambridge Handbook of the Neuroscience of Creativity* (Cambridge University Press 2018), 305.

²⁹⁵ Antonio R Damasio, 'Some Notes on Brain, Imagination and Creativity' [2001] *The Origins of Creativity* 59, 64–5.

Two motivational characteristics have a substantial relationship with creative production: focus and continuous effort. Focus, which can be identified via neuroscientific techniques, is an important component of artistic creation.²⁹⁶ Creativity necessitates the capacity to tune out external influences.²⁹⁷ According to academics studying creativity, creativity involves the ability ‘to stay deeply absorbed in self-generated thoughts, despite the constant exposition of potentially interfering sensory stimulation’.²⁹⁸ Neuroimaging studies also demonstrate a link between concentrated attention and success in creating novel ideas.²⁹⁹ Not only must artists be able to focus on the work at hand, but they must also be willing to make continuous effort in pursuit of a creative purpose. According to several psychologists, the creative process is divided into phases and begins with ‘an early “preparation” phase’ that is ‘difficult and time-consuming’, rather than spontaneous and uncomplicated.³⁰⁰ ‘[C]reativity isn’t a burst of inspiration; it’s mostly conscious hard work.’³⁰¹

Secondly, it is vital to comprehend what has come before, since creativity necessitates an examination of the expressive output in question in relation to the previous work and common practices of the relevant creative community. This emphasises that without domain-specific reference, there is no foundation for distinguishing what constitutes creativity and what does not. Therefore, highly creative people are more likely to be creative in one field than many, because ‘it takes a lot of experience, knowledge, and training to be able to identify good problems’.³⁰²

According to some psychologists, creativity is a dual process in which artists cycle between producing ideas and appraising concepts against a set of norms.³⁰³ It is beneficial to acquire domain training in order to learn these standards. ‘In general, creative individuals are exceptionally informed about a certain topic. It’s not impossible to come up with a brilliant concept without ever having worked in a field of study, but it’s highly unlikely.’³⁰⁴ Before you begin creating, it is critical to familiarise yourself with the conventions, techniques and history of your chosen discipline.³⁰⁵ Even for individuals who wish to push boundaries, it is vital to understand what they are challenging.

²⁹⁶ Joseph Kasof, ‘Creativity and Breadth of Attention’ (1997) 10 *Creativity Research Journal* 303, 310. Arguing that ‘breadth of attention is positively related to creative performance’.

²⁹⁷ DL Zabelina, ‘Attention and Creativity’ in Jung and Vartanian (eds), *The Cambridge Handbook of the Neuroscience of Creativity* (Cambridge University Press 2018), 164.

²⁹⁸ M Benedek, ‘Internally Directed Attention in Creative Cognition’ in Jung and Vartanian (eds), *The Cambridge Handbook of the Neuroscience of Creativity* (Cambridge University Press 2018), 189.

²⁹⁹ Mathias Benedek and others, ‘To Create or to Recall Original Ideas: Brain Processes Associated with the Imagination of Novel Object Uses’ (2018) 99 *Cortex* 93, 99.

³⁰⁰ Ulrich Kraft, ‘Unleashing Creativity’ (2005) 16 *Scientific American Mind* 16, 22.

³⁰¹ R Keith Sawyer, *Explaining Creativity: The Science of Human Innovation* (2nd edn, Oxford University Press 2012) 387.

³⁰² *ibid* 65.

³⁰³ Oded M Kleinmuntz, Tal Ivancovsky and Simone G Shamay-Tsoory, ‘The Two-Fold Model of Creativity: The Neural Underpinnings of the Generation and Evaluation of Creative Ideas’ (2019) 27 *Current Opinion in Behavioral Sciences* 131, 131.

³⁰⁴ Carlos Blanco, ‘Philosophy, Neuroscience, and the Gift of Creativity’, (2017) *Argumenta Philosophica* 1, 95, 108.

³⁰⁵ Chetan Walia, ‘A Dynamic Definition of Creativity’ (2019) 31 *Creativity Research Journal* 237, 242.

It is important to note that domain-specific expertise alone does not guarantee creativity. There must also be the development of innovative approaches to combining materials in unconventional or unexpected ways. However, domain-specific knowledge is a crucial component of creative achievement. Without understanding what has already been accomplished, an individual lacks the foundation upon which to build their creative work. As a result, it is essential to start the creative process by thoroughly familiarising oneself with previous works and internalising the symbols and traditions of the relevant domain.

Finally, specialists may reliably recognise and appreciate creative activity in a field that is not their own, where those with expertise in the topic (but a lower level of expertise) do not. The law assumes that everyone is equally capable of being creative, notwithstanding evidence of authorial knowledge and experience. However, in reality, people's creative capacities vary. Recent neuroscientific research demonstrates the uneven distribution of creative potential.³⁰⁶ According to research, expertise is significantly correlated with the ability to produce creative output.³⁰⁷ Even a basic familiarity with an art form can result in substantial physiological changes during the creative process. In an experiment, neuroscientists examined the brain activity of professional comedians and aspiring comedians, as well as a group of individuals with the same high intelligence as the other participants but no experience as comedians.³⁰⁸ Every participant was asked to create a caption for a blank *New Yorker* cartoon.³⁰⁹ While the perceived quality of humorous creations may seem subjective, it has been found that individuals generally agree on what is funny to a significant extent, allowing captions to be evaluated based on rankings and audience reactions such as spontaneous laughter.³¹⁰ The experts' brains functioned differently from those of the other participants while creating captions, according to the study.³¹¹

Scientists believe that both production and judgement are unconscious brain processes,³¹² and that chemical processes drive all of our activities.³¹³ To clarify, when faced with several possibilities, the brain undergoes a series of chemical events, which cause neurons to activate. The option that causes the greatest number of neurons to activate is the one we pick instinctively.³¹⁴ If that decision is effective, humans will unconsciously recall it for its efficacy and will continue to make that choice in the future, in a Pavlovian way.³¹⁵ In other

³⁰⁶ Kai Zhou, 'What Cognitive Neuroscience Tells Us about Creativity Education: A Literature Review' (2018) 5 *Global Education Review* 20, 24.

³⁰⁷ Ioanna Zioga and others, 'From Learning to Creativity: Identifying the Behavioural and Neural Correlates of Learning to Predict Human Judgements of Musical Creativity' (2020) 206 *NeuroImage* 116311, 17.

³⁰⁸ Ori Amir and Irving Biederman, 'The Neural Correlates of Humor Creativity' (2016) 10 *Frontiers in Human Neuroscience* 597, 2.

³⁰⁹ *ibid.*

³¹⁰ *ibid.*

³¹¹ *ibid.* 10.

³¹² Eddy Nahmias, 'Your Brain as the Source of Free Will Worth Wanting: Understanding Free Will in the Age of Neuroscience' 137.

³¹³ Yuval Noah Harari, *Homo Deus: A Brief History of Tomorrow* (Random House 2016) 292–6.

³¹⁴ Nahmias (n 312). (Manuscript at 5)

³¹⁵ Harari (n 313) 42.

words, it is possible to claim that a human's creative potential is exclusively dependent on intelligence, experience and subsequent training in the confines of a particular field, such as theoretical physics.³¹⁶ As a result, the difference between Hawking and the rest of humankind, at least in terms of creative ability, is a difference in the degree of problem-solving skills obtained via experience, memorised knowledge, hard training and the high capacity of his brain to process information.³¹⁷ It is clear that computers are faster than humans at information processing and may have greater capacity. By understanding human creativity via neuroscientific studies, all the other critical variables, such as focus, continuous effort, domain and field, can be coded by programmers and processed by the neural network of today's intelligent machines.

5. CONCLUSION

Throughout this article the author examined current perspectives on creativity within US, EU and UK copyright laws. In doing so he explored legal implications for AI-generated works as well as perspectives on whether or not humans are inherently unique creative beings. In the final section, the author argued that creativity can be coded and machines can be creative, by depending on research, theories and approaches to creativity in the fields of psychology, philosophy and neuroscience.

By integrating insights from the fields of psychology, philosophy, and neuroscience, this article has initiated an examination into the concept of creativity that encompasses both the inner workings of the human intellect and the binary operations of artificial intelligence. The exploration of these fields of study unveils a common theme: creativity is not a mystical inspiration that speaks exclusively to selected individuals; rather, it is a capacity constrained by specific mechanisms and constituents that are comprehensible, quantifiable, and, indeed, replicable. From a psychological standpoint, creativity is conceptualised as a componential and cognitive process that combines heuristic exploration, domain-specific knowledge, and problem-solving. According to philosophical perspective, creativity can be defined as the origin of novel, unexpected, and valuable ideas or artefacts, which may be generated by means of combination, exploration, or transformation. Neuroscience provides an empirical foundation for these theories, demonstrating how creative cognition connects with certain patterns of neural activity.

Upon synthesising these insights, a profound realisation emerges: should creativity be possible to disassemble into its component parts and processes, then artificial intelligence, which demonstrates exceptional proficiency in data processing, pattern recognition, and iterative learning, could, in fact, exhibit creative capabilities. This is already being demonstrated by the capacity of AI systems to generate original concepts, resolve intricate challenges, and produce work that elicits an aesthetic response from humans. As a result, this article reaches the pinnacle of its investigation with a startling but unavoidable conclusion: AI is capable of creativity. Contemporary AI not only replicates creativity, but actively enga-

³¹⁶ Marvin L Minsky, 'Why People Think Computers Can't' (1982) 3 *AI Magazine* 3, 5.

³¹⁷ *ibid.*

ges in the fundamental aspects of the creative process. It outlines problems applies domain-specific knowledge and develops unique and valuable solutions. It exhibits the capacity to focus, work continuously, and explore domains with an ever-expanding bank of information, much like the neural networks seen in the human brain.

The subject of AI's creative potential is more than just an intellectual one in the legal sphere; it is a problem of defining authorship and originality in the digital era, especially in the context of copyright. If creativity is defined as the capacity to generate original, non-derived works that are fixed in a tangible medium, then AI-generated artworks are well-suited to fulfil this definition. As AI advances, it blurs the distinction between human and machine creations, forcing us to re-evaluate concepts like creativity, originality and authorship. In this regard, theories, concepts and arguments from a variety of fields provided in this article provide credence to a daring claim: AI can be creative. In this pivotal moment of transition, it is crucial to recognise and fully embrace the creative capabilities of artificial intelligence. This acceptance not only broadens our understanding of creativity but also signals a future where human and computer creativity merge, creating new opportunities for innovation and creative expression.

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