

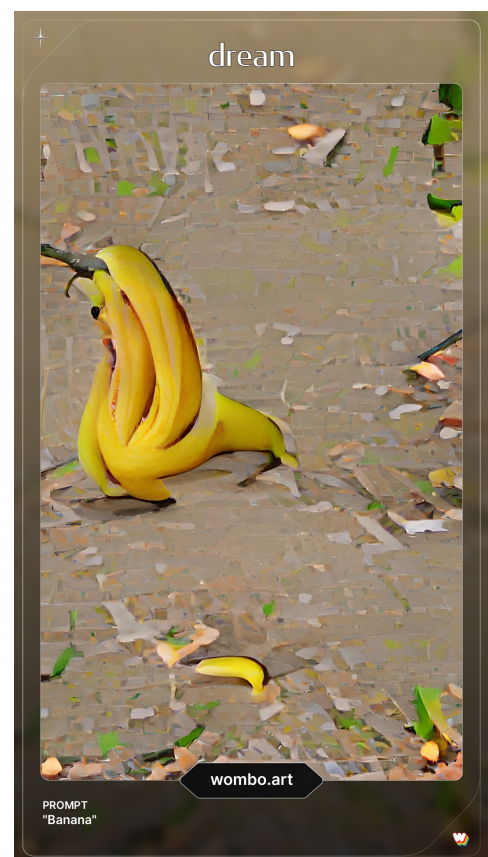
The Legal Status of AI-Generated Works

Contents

I.	Introduction	3
II.	The technology behind AI-generated works.....	5
1.	What is AI, and how intelligent is it?.....	6
2.	The technology behind creative AI systems.....	8
3.	Concluding remarks.....	12
III.	Assessment of AI-generated works under EU copyright law.....	12
1.	Principles of EU copyright law.....	13
1.1.	The four-step test	13
1.1.1.	Production in the literary, scientific, or artistic domain	14
1.1.2.	Human authorship	14
1.1.3.	Originality	15
1.1.4.	Expression in the final outcome – The Idea/Expression dichotomy	17
1.2.	Authorship and the role of assistants.....	18
1.3.	Aleatoric elements	19
1.4.	Concluding remarks	20
2.	Application to AI-generated works	21
2.1.	General considerations for the copyright of AI-generated works	21
2.2.	Developers as authors	23
2.3.	User as author	26
2.3.1.	The “artificial assistant” – prompt as instruction.....	27
2.3.2.	Originality through experimentation	29
2.3.1.	Prompt derived originality	30
2.3.1.	Conclusion and consolidation	32
2.4.	Copyright through selection and presentation of the output.....	33
2.5.	Presumption of authorship.....	35
2.6.	Concluding remarks	36
IV.	Should AI-generated works be protected?	37
1.	Is there a need for copyright protection?	37
2.	Unfair competition law as an alternative?	39
V.	Conclusion.....	41
	Bibliography	42

I. INTRODUCTION

1. Artificial intelligence (AI) is one of the buzzwords of the last decade. Many aspects of our lives are now shaped by AI and soon expected to be dominated by it. Until recently, the cultural and artistic field was hailed as one of the few truly human-dominated areas that cannot be taken over by AI. In recent years, however, the market has been flooded with AI-driven creative applications that enable the creation of digital art within seconds at the push of a button. The advent of AI-powered art has sparked discussions in the art world about creativity and the future of human artists. In the legal world, questions quickly arose as to the intellectual property implications of works created solely by AI and without any or significant human involvement.
2. The underlying paper will address the implications of EU copyright law for AI-generated artistic works. I will address the crucial issues for AI-generated works in general and analyse two popular AI art generators, Dream by WOMBO ("WOMBO"), developed by Wombo Studios, Inc. and DALL-E by OpenAI, as examples.
3. WOMBO is a free-to-use mobile phone application that lets its users “enter a prompt [of maximum 80 characters], pick an art style and watch WOMBO Dream turn [the users] idea into an AI-powered painting in seconds”.¹ Among other features, WOMBO allows users to leave the style selection to the program. Then, within seconds, the application creates ready-to-publish output based on textual prompts selected by the user. The image on the right was created without effort, using the textual prompt “Banana”.
4. DALL-E is another AI model that allows users to create realistic images based on text descriptions in natural language. Its newest version, DALL-E 2, is arguably the most sophisticated so-called text-to-image system



AI-generated WOMBO output based on the prompt: "Banana"

¹ WOMBO, 'Dream created by WOMBO' <<https://www.wombo.art/>> accessed 22 March 2022.

available. Unfortunately, DALL-E 2 is not yet open to the broader public, but stunning examples of the output are presented on OpenAI's website.² Nevertheless, given the immense technical progress of DALL-E 2 and the recent media attention, it is appropriate to examine the copyright implications of DALL-E output.

5. While these AI artworks and their copyrightability may be regarded as a theoretical playground for tech-savvy lawyers, the likely future commercial applications of systems like WOMBO and DALL-E and the mouth-watering prices paid for AI-generated art in auctions makes an analysis of copyright protection indispensable.³ In the following paper, I will first explain the basics of the technology behind AI-generated works, in particular behind systems such as WOMBO and DALL-E. This basic understanding of the technical aspects is crucial for analysing AI-generated works in the context of EU copyright law. Section III.1. sets out the principles of EU copyright law that are most relevant to AI-generated works. Section III.2. then applies these principles to AI-generated works. These two sections will identify the difficulties in applying European copyright law to AI-generated works and propose possible solutions to some of these alleged shortcomings. Finally, Section IV will analyse whether unfair competition laws are a viable alternative when copyright protection is not possible and whether AI-generated works should be protected according to the rationales of EU copyright law.
6. I will conclude that EU copyright law is not in complete synchrony with the 'truth of art' because it is hard to establish copyright protection for AI-generated works that require significant exercise of human creative choices.⁴ However, EU copyright law is familiar with the difficulties that arise with AI-generated art, so a radical reform of copyright law is arguably not needed.

² OpenAI, 'DALL-E 2' <<https://openai.com/dall-e-2/>> accessed 18 July 2022; OpenAI, 'DALL-E: Creating Images from Text' <<https://openai.com/blog/dall-e/>> accessed 26 July 2022.

³ According to OpenAI, DALL-E will likely be used for "commercial projects, like illustrations for children's books, art for newsletters, concept art and characters for games, moodboards for design consulting, and storyboards for movies", OpenAI, 'DALL-E now Available in Beta' (OpenAI, July 20 2022) <<https://openai.com/blog/dall-e-now-available-in-beta/>> accessed 25 July 2022; Christie's, 'Is artificial intelligence set to become art's next medium?' (12 December 2018) <<https://www.christies.com/features/a-collaboration-between-two-artists-one-human-one-a-machine-9332-1.aspx>> accessed 25 January 2022.

⁴ Nadia Walravens, 'The Concept of Originality and Contemporary Art' in Daniel McClean and Karsten Schubert (eds), *Dear Images Art, Copyright and Culture* (Ridinghouse 2002) 171.

II. THE TECHNOLOGY BEHIND AI-GENERATED WORKS

7. AI is often regarded as the creative force behind artistic output and its intellectual capacities are often not questioned and taken as a premise.⁵ Based on assumptions about AI's autonomy and intelligence, many scholars propose fundamental changes to legal systems without even agreeing on what an artificial invention is.⁶ Analysis of the underlying technology is often skipped completely or treated superficially before delving into legal questions arising from non-human creativity.⁷ Even important authorities such as the UK's Intellectual Property Office succumb to arguably frivolous assumptions such as the statement, "*Some AI systems are capable of autonomously generating new works*".⁸
8. It seems that this reluctance to analyse the technology behind AI stems from the unfortunate choice of terms currently used to describe AI.⁹ Terms such as machine learning, neural networks, and artificial intelligence are often used interchangeably and give the impression that machines have reached or even surpassed human cognitive capacities. Further, common issues such as the so-called "black-box problem", describing the reality that some AI models become so complex that not even their developers can explain how machines reach certain conclusions, are seemingly taken as evidence for autonomous computer creativity.
9. In the following chapter, I intend to demystify the intellectual capabilities of current AI systems and introduce the technology behind creative AI systems such as WOMBO and DALL-E. I will show that human involvement is still indispensable for such AI systems. This demystification is indispensable for subsequent analysis of output generated by such AI systems under current EU copyright law. Acknowledgement of this fact will show that AI does not necessarily require radical reforms to the current copyright regime within the EU.

⁵ Daria Kim, 'AI-Generated Inventions': Time to Get the Record Straight?' (2020) GRUR International 443, 444.

⁶ *ibid*, 444.

⁷ David Lehr and Paul Ohm, 'Playing with the Data: What Legal Scholars Should Learn about Machine Learning' (2017) 51 UCD L Rev 653, 668.

⁸ Intellectual Property Office, Consultation outcome, Artificial intelligence call for views: copyright and related rights (Updated 23 March 2021 <<https://www.gov.uk/government/consultations/artificial-intelligence-and-intellectual-property-call-for-views/artificial-intelligence-call-for-views-copyright-and-related-rights>> accessed 29 June 2022.

⁹ Kim (n 5), 444.

1. WHAT IS AI, AND HOW INTELLIGENT IS IT?

10. Defining AI is not easy and has been subject to significant debate.¹⁰ As of today, there is no conclusive definition.¹¹ The term AI was coined by the American computer scientist John McCarthy, who chose it as the title of a conference in 1956, which is considered the birth of the research field of artificial intelligence.¹²
11. Part of the definitional problem lies in the difficulty of determining whether AI is intelligent at all. The answer to this question in turn depends on the definition of intelligence.¹³ The challenge of comparing artificial intelligence to human intelligence is further complicated by the fact that human thought is not fully understood to this day.¹⁴ Various tests have been proposed to grasp and challenge the notion of computer intelligence. The two most important approaches come from the English computer scientist Alan Turing and the American philosopher John Searl.
12. Turing sought to answer the question of artificial intelligence using a communicative approach, according to which a computer is considered intelligent if a human interacting with the computer cannot tell whether he or she is dealing with a computer or a human.¹⁵ Following this approach, most existing AI systems would likely be considered intelligent.
13. On the other hand, there is the approach that AI systems are considered intelligent only if they are sentient, i.e., aware of their capabilities.¹⁶ According to this approach developed by Searl, most existing AI systems merely simulate intelligence rather than possess it. Searl used the metaphor of the so-called Chinese room to prove the absence of cognitive machine intelligence.¹⁷ Imagine a non-Chinese speaking person sitting in a room and being handed written Chinese messages. The person does not understand the meaning of the Chinese characters but has a book with corresponding answers to each message. After receiving the message, the person looks up the corresponding answer and sends a message back. Without understanding the Chinese

¹⁰ Axel Grätz, *Künstliche Intelligenz im Urheberrecht* (Springer 2021) 9ff; Ryan Abbott, *The Reasonable Robot Artificial Intelligence and the Law* (2020) CUP 22.

¹¹ Grätz (n 10) 9.

¹² *ibid.*, 8f; IBM Cloud Education, 'What is Artificial intelligence?' (*IBM Cloud Learn Hub*, 3 June 2020) <<https://www.ibm.com/cloud/learn/what-is-artificial-intelligence>> accessed 3 July 2022.

¹³ Abbott (n 10) 23.

¹⁴ *ibid.*, 26; Grätz (n 10) 11.

¹⁵ Grätz (n 10) 9f.

¹⁶ Abbott (n 10) 25.

¹⁷ David Cole, 'The Chinese Room Argument' (*The Stanford Encyclopedia of Philosophy*, 2020) <<https://plato.stanford.edu/entries/chinese-room/>> accessed 3 July 2022.

language, the person in the room functionally imitates a native Chinese speaker. This is arguably how AI can be understood - it is capable of imitating an intelligent human but has no semantic understanding of what it is doing.¹⁸

14. A further way to consolidate these two approaches and grasp computer intelligence is by categorising AI into strong and weak. Weak AI can solve predetermined problems that it is programmed to solve.¹⁹ It is incapable of going beyond its determined function and has no cognitive understanding of its problem-solving capacities.²⁰ Strong AI, on the other hand, typically refers to generally intelligent machines capable of learning to solve any type of problem they face - much like humans - and also have full awareness and understanding.²¹ Strong AI - or super intelligent AI, which describes AI that surpasses human intelligence - is still "purely speculative."²² While some doubt that strong AI will ever be developed, others do not see the development of strong AI in the near future.²³
15. Regardless of the incredible technological leaps, we may not even be able to prove consciousness in machines, let alone detect it when it appears. Proving the consciousness of another being - in this case, a computer - will be as difficult as proving that one is not the only conscious human being in the world - a question that has always preoccupied philosophers.²⁴ This discussion became headline news in June 2022 when Blake Lemoine, a senior Google engineer, claimed Google LaMDA ("Language Model for Dialogue Applications") had become sentient.²⁵
16. Irrespective of the elaborations on strong AI, there is broad agreement that all currently existing AI can be classified as weak AI.²⁶ The underlying paper is based on this premise. According to

¹⁸ Abbott (n 10) 25.

¹⁹ *ibid*, 24; Grätz (n 10) 14.

²⁰ Grätz (n 10) 14.

²¹ *ibid*; IBM Cloud Education, 'What is strong AI?' (*IBM Cloud Learn Hub*, 31 August 2020) <<https://www.ibm.com/cloud/learn/strong-ai>> accessed 3 July 2022.

²² IBM (n 21); Grätz (n 10) 14.

²³ Abbott (n 10) 24; Jane Croft, 'Inability to patent AI creations could hit business investment' *Financial Times* (16 June 2022); Grätz (n 10) 14.

²⁴ John Horgan, 'How Do I Know I'm Not the Only Conscious Being in the Universe?' (*Scientific American*, 11 September 2020) <<https://www.scientificamerican.com/article/how-do-i-know-im-not-the-only-conscious-being-in-the-universe/#:~:text=I%20prefer%20to%20call%20it,will%20vanish%20when%20you%20die.>> accessed 3 July 2022; Tam Hunt, 'How can you tell if another person, animal or thing is conscious? Try these 3 tests' (*The Conversation*, 1 July 2019) <<https://theconversation.com/how-can-you-tell-if-another-person-animal-or-thing-is-conscious-try-these-3-tests-115835>> accessed 3 July 2022.

²⁵ Richard Luscombe, 'Google engineer put on leave after saying AI chatbot has become sentient' *The Guardian* (12 June 2022) <<https://www.theguardian.com/technology/2022/jun/12/google-engineer-ai-bot-sentient-blake-lemoine>> accessed 20 June 2022; Economist, 'Could artificial intelligence become sentient?' *Economist* (14 June 2022).

²⁶ Abbott (n 10) 33; Grätz (n 10) 40.

Abbott, this entire discussion is further irrelevant because it does not matter whether AI is capable of thinking for the generated output.²⁷ In principle, this can be agreed with, but the analysis below will show that conscious decisions play a decisive role in copyright authorship.

17. In view of the unlikely emergence of strong, fully cognitive AI in the near future, arguably the most appropriate definition of AI, which focuses more on the underlying techniques, has been proposed by the European Commission.²⁸ According to Article 3(1) of the proposed AI act:

(1) ‘artificial intelligence system’ (AI system) means software that is developed with one or more of the techniques and approaches listed in Annex I and can, for a given set of human-defined objectives, generate outputs such as content, predictions, recommendations, or decisions influencing the environments they interact with;

18. Annex I then sets out the following approaches:

(a) Machine learning approaches, including supervised, unsupervised and reinforcement learning, using a wide variety of methods including deep learning;

(b) Logic- and knowledge-based approaches, including knowledge representation, inductive (logic) programming, knowledge bases, inference and deductive engines, (symbolic) reasoning and expert systems;

(c) Statistical approaches, Bayesian estimation, search and optimization methods.

19. Based on this definition of AI systems, the following section will explain the technology behind systems such as WOMBO and DALL-E.

2. THE TECHNOLOGY BEHIND CREATIVE AI SYSTEMS

20. Based on the premise that all existing AI systems fall into the category of weak AI, the following paragraphs intend to briefly introduce what such “creative machines” do and how.

²⁷ Abbott (n 10) 27.

²⁸ Commission, ‘Proposal for a Regulation of the European Parliament and of the Council laying down harmonised rules on artificial intelligence (Artificial Intelligence Act) and amending certain Union legislative acts’ COM (2021) 206 final.

21. WOMBO and DALL-E are capable of so-called text-to-image synthesis or conditional image generation, whereby text prompts are converted into semantically consistent images.²⁹ Such AI systems are generally based on so-called machine learning approaches.
22. In principle, machine learning is about teaching a computer program to automatically “*identify patterns in data and apply the learned knowledge to new data*”.³⁰ This process revolves around the analysis of data by algorithms. Algorithms can be understood as instructions for a computer.³¹ A trained machine learning model “*is an algorithm based upon a (nonlinear) mathematical function that generates output based on the learned patterns in the training data*”.³² The creation of a usable machine learning model can therefore be divided - for a basic understanding - into two very general phases, namely the programming of the architecture of the model and the subsequent training with data.³³
23. Artificial neural networks are the best-known architecture (structure) for machine learning models. The goal is to create a structure that mimics how the human brain works.³⁴ Artificial neural networks consist of mathematical functions (so-called “neurons”) which transform inputs (independent variables) into outputs (dependent variables).³⁵ Algorithms ‘learn’ how to correlate specific inputs with outputs throughout the training process by inferring functions that describe the correlation.³⁶ In straightforward terms, one can imagine having two different input values - for example, the numbers 1 and 2 - and an output value of 3.³⁷ Machine learning is about finding a rule that describes the correlation between these three data points, i.e. an addition rule (1+2=3). Training an algorithm is about providing it with desired inputs and expected outputs for the algorithm to come up with functions correlating to the data.³⁸ These computer-generated rules can even be more accurate and efficient than rules explicitly created by humans.³⁹ After the training process is complete, all that remains is the function, which can then be applied to new

²⁹ Razan Bayoumi and others, ‘Text-to-Image Synthesis: A Comparative Study’ in Dalia A. Magdi and others (eds) *Digital Transformation Technology. Lecture Notes in Networks and Systems* (Springer, 2022) 229.

³⁰ Josef Drexl and others, ‘Technical Aspects of Artificial Intelligence: An Understanding from an Intellectual Property Law Perspective’ (2019) Max Planck Institute for Innovation and Competition Research Paper No. 19-13, 3; Kim (n 5) 446.

³¹ *ibid*, 4, 12.

³² *ibid*, 5.

³³ *ibid*, 4; Such a simplified presentation is – arguably rightly – criticised by *Lehr* and *Ohm* who define eight steps for machine learning and give particular attention to the ways in which developers can “play with data”, see *Lehr/Ohm* (n 7) 655, 669ff.

³⁴ Drexl (n 30) 5; Jean Paul Mueller and Luca Massaron, *Machine Learning for Dummies* (Hoboken: Wiley 2016) 31.

³⁵ Drexl (n 30) 5; Kim (n 5) 451.

³⁶ Kim (n 5) 451.

³⁷ Mueller/Massaron (n 34) 32.

³⁸ *ibid*.

³⁹ Abbott (n 10) 30.

data that was not part of the training process - the model has "learned" the correlations from the data and can now be used without the training data.⁴⁰ Importantly, algorithms do not magically come up with these functions but strongly rely on human programmed algorithms (instructions) to process "*x to get y, by using simpler functions such as addition, multiplication and exponentiation*".⁴¹ "*Instead of being 'explicitly programmed in a conventional sense (i.e. by providing a workflow-type list of commands), machine learning leverages mathematical and statistical methods*".⁴² Neural networks can thus be described as mere "*long sequences of summations and multiplications*" and machine learning simply as a "*statistical matter of which variables are most correlated with the outcome*".⁴³

24. Computer scientists say that a network consists of different layers when the output of the neurons is fed into further neurons. When a model consists of many layers, the neural network becomes a so-called deep neural network, which gave its name to the popular term "deep learning".⁴⁴
25. A simple application of machine learning would be to train a model to recognise cats in pictures by training it with a dataset of labelled cat pictures.⁴⁵ The trained model could then recognise a cat in a photo it has not seen before because it has 'learnt' from the dataset to recognise a cat.
26. Text-to-image synthesis is about reversing this process, i.e., training a model to produce an image representing a cat on instruction. The development of such generative models, capable of detecting correlations in input data to produce entirely new results that could plausibly belong to an original data set, has been hailed as a technological breakthrough.⁴⁶ The state-of-the-art technology behind text-to-image synthesis are so-called generative adversarial networks (GANs), which are deep-learning-based machine learning models.⁴⁷ A GAN relies on an interplay between two neural networks "*that are set one against the other to generate newly synthesised instances of data that can pass for real data*".⁴⁸ A generating network learns how to

⁴⁰ Drexl (n 30) 8.

⁴¹ Kim (n 5) 451.

⁴² *ibid.*

⁴³ *ibid.*

⁴⁴ Drexl (n 30) 6.

⁴⁵ *ibid* 5.

⁴⁶ Jason Brownlee, 'A Gentle Introduction to Generative Adversarial Networks (GANs)' (*Machine Learning Mastery*, 17 June 2019) <<https://machinelearningmastery.com/what-are-generative-adversarial-networks-gans/>> accessed 4 July 2022.

⁴⁷ However, technological advances are very rapid in this area. DALL-E 2 is already based on an arguably improved generative machine learning model – a so-called "diffusion model". See Prafulla Dhariwal and Alex Nichol, 'Diffusion Models Beat GANs on Image Synthesis' (*arxiv*, 2021) <<https://arxiv.org/abs/2105.05233v4>> accessed 4 July 2022.

⁴⁸ Sreejani Bhattacharyya, 'Diffusion Models Vs GANs: Which one to choose for Image Synthesis' (*AIM*, 7 February 2022) <<https://analyticsindiamag.com/diffusion-models-vs-gans-which-one-to-choose-for-image-synthesis/>> accessed 4 July 2022.

generate plausible data. This data is then passed to a discriminating network that decides on the plausibility of the output matching a label. The discriminator then provides feedback to the generator for subsequent attempts until the discriminator can no longer distinguish between real and fake data.⁴⁹

27. This oversimplified insight into the technology behind generative AI systems shows that seemingly creative AI output does not come about magically. Even the most sophisticated generative machine learning models that use self-modifying code are just complex algorithmic instructions that analyse data according to their programmers' instructions and depend on how and with what data they are trained.⁵⁰ According to Kim, a computer's problem-solving capacity strongly relies on “*the overall computational procedure*” set up and construed by human developers to achieve specific goals.⁵¹ In the case of artificial neural networks, the human selection of datasets is the decisive factor for determining “*how the input-output relation is computed*”.⁵²
28. Ultimately, computers are incapable of deviating from the instructions given by their programmers.⁵³ Thus, AI cannot be held to create artistic output autonomously – autonomy should not be confused with automation.⁵⁴ Also, the use of – often intentional – randomness in machine learning algorithms should not be confused with autonomy, let alone creativity.⁵⁵ The unpredictability of AI-generated works does not result from intelligent machine creativity, but rather from the deliberate built-in elements of randomness and the lack of knowing how exactly a trained model will process specific new input data.⁵⁶ Often, machine learning algorithms evolve into such complexity that not even the developers can explain the rules a model deployed to generate particular solutions/output – a phenomenon known as the “black-box problem”.⁵⁷ However, not fully understanding the “learned” correlations between data does not mean one does not understand how a network was trained.⁵⁸ Last but not least, the importance of the ability

⁴⁹ *ibid*; Drexl (n 30), 8.

⁵⁰ Jane C. Ginsburg and Luke Ali Budiardjo, ‘Authors and Machines’ (2019) Berkeley Tech L. R. 343, 408, fn230.

⁵¹ Kim (n 5) 452.

⁵² *ibid*.

⁵³ Ginsburg/Budiardjo (n 50) 400.

⁵⁴ Kim (n 5) 446.

⁵⁵ Jason Brownlee, ‘What Does Stochastic Mean in Machine Learning?’ (*Machine Learning Mastery*, 24 July 2020) <<https://machinelearningmastery.com/stochastic-in-machine-learning/>> accessed 5 July 2022; Grätz (n 10) 81, fn 732f; Ginsburg/Budiardjo (n 50) 398.

⁵⁶ Kim (n 5) 454.

⁵⁷ Ginsburg/Budiardjo (n 50) 402.

⁵⁸ Kim (n 5) 454.

to explain how a solution was developed can be questioned in itself, as the integrity of human inventions is usually not distrusted, although it is often impossible to present trains of thought in a coherent way (“flash of genius”).⁵⁹

3. CONCLUDING REMARKS

29. This brief introduction to AI has shown that fully autonomous artificial creativity does not exist today and that current AI systems are not (yet) comparable to human intelligence. According to Kim, a distinction between “*human and non-human ingenuity is, in itself, artificial*”.⁶⁰ As of today, machines are still processes developed and planned by humans “*to accomplish specific tasks*”.⁶¹ The intentional use of elements of randomness does not change the fact that existing AI systems are not autonomous, and AI-generated output always requires human involvement at one stage or another. Building on these technological foundations, the following part of this paper will now proceed with a legal analysis of artistic AI-generated output under EU copyright law.

III. ASSESSMENT OF AI-GENERATED WORKS UNDER EU COPYRIGHT LAW

30. This chapter will evaluate the legal *status quo* of the protection granted to AI-generated works under the copyright regime of the EU. The focus will lie on whether AI-generated works can meet the originality standard set by the European Court of Justice (ECJ). It will be shown that under the current copyright regime, the originality condition poses a significant hurdle to overcome, especially when most creative choices are seemingly left to the “decision” of AI.
31. First, I will outline some general principles of EU copyright law that are essential for evaluating AI-generated works. The remainder of this section will explore various options that could lead to copyright protection of works produced with generative AI, such as WOMBO and DALL-E. This investigation will highlight the difficulties in establishing copyright protection. Based on these findings, I will also propose possible solutions to overcome these hurdles that would allow AI-generated works to be included without fundamental changes to the EU copyright regime.

⁵⁹ *ibid.*

⁶⁰ *ibid.*, 453.

⁶¹ Ginsburg/Budiardjo (n 50) 397.

1. PRINCIPLES OF EU COPYRIGHT LAW.

32. Today, copyright law within the European Union is not a unitary right but largely still a "*bundle of national laws*", which – in some areas – implement EU Directives.⁶² The EU regulatory framework for copyright and neighbouring rights currently consists of 11 directives and two regulations.⁶³ However, these legislative tools far from cover all areas of copyright law – meaning that important aspects remain un-harmonised.⁶⁴
33. The most influential driver of EU copyright law is arguably the ECJ, which has played a pivotal role in harmonising national copyright laws in the EU by interpreting the Directives mentioned above.⁶⁵ However, despite the crucial interpretations of the ECJ, national courts still maintain leeway in applying, for example, the originality standard set out by the ECJ. Moreover, the different national copyright regimes within the EU are based on long-standing traditions, which may still influence the application of the harmonised copyright standards.⁶⁶ Subsequently, a conclusive analysis of the copyrightability of AI-generated works within the EU always requires a case-by-case analysis of the applicable jurisdiction. However, some general aspects are henceforth presented.

1.1. THE FOUR-STEP TEST

34. As the treatment of works created with or by artificial intelligence (AI-generated works) is not yet regulated in EU legislation, any possible protection would have to be based on general copyright conditions within the EU, most of which can be derived from ECJ case law. Following a four-step test laid out by Hugenholtz and Quintais⁶⁷, a work is copyrightable in the EU if it:
- (1) is a production in the literary, scientific, or artistic domain,
 - (2) emanates from a human creator,

⁶² Annette Kur and Thomas Dreier, *European intellectual property law: texts, cases and materials* (Edward Elgar 2013) 246.

⁶³ European Commission, 'The EU copyright legislation' (*European Commission*, 23 February 2022) <<https://digital-strategy.ec.europa.eu/en/policies/copyright-legislation>> accessed 19 March 2022.

⁶⁴ Kur/Dreier (n 62), 255; Eleonora Rosati, *Originality in EU Copyright* (Edward Elgar 2013), 1f.

⁶⁵ Kur/Dreier (n 62), 246.

⁶⁶ Annabelle Littoz-Monnet, 'Copyright in the EU: *droit d'auteur* or right to copy?' (2006) 13:3 *Journal of European Public Policy* 438, 440ff; P. Bernt Hugenholtz and João Pedro Quintais, 'Copyright and Artificial Creation: Does EU Copyright Law Protect AI-Assisted Output?' (4 October 2021) *Springer* 1190, 1198; Thomas Margoni, 'The Harmonisation of EU Copyright Law: The Originality Standard' in Mark Perry (ed) *Global Governance of Intellectual Property in the 21st Century* (Springer 2016) 101.

⁶⁷ Hugenholtz/Quintais (n 66) 1200.

- (3) is original, and
- (4) expressed in the final outcome.

1.1.1. PRODUCTION IN THE LITERARY, SCIENTIFIC, OR ARTISTIC DOMAIN

- 35. The first condition originates from the definition of 'work' in Article 2(1) of the Berne Convention, which is part of the EU legal order and often drawn upon by the ECJ.⁶⁸ Objectively, AI can produce and assist in producing output in the literary, scientific, or artistic domain. Most of the outputs mentioned in an exemplary manner in Article 2(1) of the Berne Convention (i.e., "*books, pamphlets and other writings;...*") can nowadays be created by or at least with the aid of AI. Over time, the ECJ defined work as anything expressing "*the authors' own intellectual creation*" and thus linked the notion of work with the main requirement for its protection – originality.⁶⁹ For an AI-generated output to qualify as a work, it must thus allow for creative freedom (see paras 38ff).⁷⁰ The notion of work in EU copyright law is generally considered open-ended as long as the originality criterion is met.⁷¹
- 36. In general, the first condition can be considered unproblematic concerning AI-generated works since they usually qualify as some sort of "*production in the literary, scientific and artistic domain, whatever may be the mode and form of its expression*".⁷²

1.1.2. HUMAN AUTHORSHIP

- 37. The second condition embodies the general anthropocentric approach to copyright in the EU and precludes AI itself from obtaining author status in the EU.⁷³ The human authorship requirement can be inferred from the Berne Convention, which states in Article 2(6) that "*protection shall operate for the benefit of the author*". Further, the case law of the ECJ unambiguously refers to the notion of human authorship when laying out that copyright protection "*presupposes that they*

⁶⁸ Hugenholtz/Quintais (n 66), 1193; Berne Convention for the Protection of Literary and Artistic Works, September 9, 1886, as revised at Stockholm on July 14, 1967, 828 U.N.T.S. 221.

⁶⁹ Caterina Sganga, 'The notion of "work" in EU copyright law after Levola Hengelo: one answer given, three question marks ahead' (2019) EIPR 415, 423.

⁷⁰ Joined Cases C-403/08 and C-429/08 Football Association Premier League Ltd and Others v. QC Leisure and Others and Karen Murphy v. Media Protection Services Ltd [2011] ECLI:EU:C:2011:631 (hereinafter, C-403/08 and C-429/08 Football Association), para. 98.

⁷¹ Sganga (n 69) 423.

⁷² Hugenholtz/Quintais (n 66), 1201; Art 2(1) Berne Convention.

⁷³ Antonia Albes, 'Urheberrechtlicher Schutz von Produkten Künstlicher Intelligenz' (2020) Berliner Rechtszeitschrift 73, 75.

are intellectual creations".⁷⁴ As outlined above, AI – for the time being – has no intellectual capacities comparable to humans. Further, there are many ways in which humans are and can be involved in creating AI-generated works (see below Section III.2.). The mere involvement of an AI in generating artistic output does not automatically preclude authorship for users or developers of generative machines. This is in line with the opinion of Advocate General (AG) Trstenjak in *Painer*, who held that "*only human creations are [...] protected, which can also include those for which the person employs a technical aid*".⁷⁵

1.1.3. ORIGINALITY

38. For a subject matter to enjoy copyright protection, it must be original.⁷⁶ The meaning of this ambiguous term is not defined in EU legislation. However, it is considered *de facto* harmonised by the ECJ, which outlined and reconfirmed what the originality criterion entails and how it should be applied in a series of influential decisions. According to the importance given to the originality condition by the ECJ, it even seems to be the sole requirement for determining copyrightability.⁷⁷
39. In *Infopaq* – the first landmark decision concerning the copyrightability of newspaper articles – the ECJ established that for any subject matter to be original, it must be the "*author's own intellectual creation*".⁷⁸ The court confirmed this criterion as the general standard of originality for all works in subsequent decisions. Before that, EU legislation had explicitly restricted this definition to the subject matter of computer programs, databases, and photographs.⁷⁹
40. In *Painer*, the ECJ clarified that a work is considered the author's own intellectual creation "*if it reflects the author's personality*".⁸⁰ The author's personality is reflected if the author "*was able to express his creative abilities in the production of the work by making free and creative*

⁷⁴ See references to case law in Hugenholtz/Quintais (n 66), 1195; Case C-05/08 *Infopaq International v. Danske Dagblades Forening* [2009] ECR I-6624 (hereinafter, C-05/10 *Infopaq*), para 34.

⁷⁵ Hugenholtz/Quintais (n 66), 1195; Case C-145/10 *Eva Maria Painer v Standard VerlagsGmbH* [2011] ECR I – 12594 (hereinafter, C-145/10 *Painer*) Opinion of AG Trstenjak, para 121.

⁷⁶ C-145/10 *Painer*, para 87.

⁷⁷ Rosati (n 64), 5.

⁷⁸ C-05/10 *Infopaq*, para 36 (emphasis added).

⁷⁹ Rosati (n 64), 4; see for example Council Directive 2009/24/EC of 23 April 2009 on the legal protection of computer programs [2009] OJ L111/16 (hereinafter, Software Directive), Art 1(3).

⁸⁰ C-145/10 *Painer*, para 88.

choices”.⁸¹ Through these free and creative choices, the author has to be able to “*stamp the work created with his ‘personal touch’*”.⁸² The emphasis here is on the “ability” to make creative choices. The ECJ does not evaluate the creativity itself of the subject matter in question.⁸³ The aesthetic value of subject matter is irrelevant in EU copyright law.⁸⁴ Also, the fact that subject matter requires “*significant skill and labour*” for its creation does not imply the necessary free and creative choices and is thus irrelevant for establishing originality.⁸⁵ EU copyright – which reflects a *Droit d’auteur* tradition – does not reward economic investment with copyright protection (see section IV.2.).⁸⁶

41. Conversely, a work cannot be considered original if its creation is “*dictated by technical considerations, rules or constraints which leave no room for creative freedom*”.⁸⁷ Furthermore, according to AG Bot, a subject matter is not original if “*the different methods of implementing an idea are so limited that the idea and the expression become indissociable*”.⁸⁸ He further held that national courts must exclude from their assessment of originality “*the elements whose expression is dictated by their technical function*” and determine originality with regard to the author’s choices and their created combinations and production of the work.⁸⁹ The ECJ confirmed this in the *Brompton* case.⁹⁰
42. Similarly, the ECJ held in *Funke Medien* on the originality of military reports that “*purely informative documents, the content of which is essentially determined by the information which they contain, so that such information and the expression of those reports become indissociable*” cannot give the author the ability to “*express his or her creativity in an original manner*”.⁹¹

⁸¹ *ibid*, para 89; Case C-604/10 *Football Dataco Ltd and Others v. Yahoo! UK Ltd and Others* [2012] ECLI:EU:C:2012:115 (hereinafter, C-604/10 *Football Dataco*), para 38.

⁸² C-145/10 *Painer*, para 92.

⁸³ *ibid*, 93; Hugenholtz/Quintais (n 66) 1201.

⁸⁴ Hugenholtz/Quintais (n 66) 1197; Case C-683/17 *Cofemel - Sociedade de Vestuário SA v. G-Star Raw CV* [2019] ECLI:EU:C:2019:72, para 54.

⁸⁵ Margoni (n 66) 95; C-604/10 *Football Dataco*, para 42.

⁸⁶ Hugenholtz/Quintais (n 66), 1194, 1197.

⁸⁷ C-604/10 *Football Dataco*, para 39; C-403/08 and C-429/08 *Football Association*, para 98; Case C-393/09 *Bezpečnostní softwarová asociace – Svaz softwarové ochrany v Ministerstvo kultury* [2010] ECR I-13971 (hereinafter, C-393/09 *Bezpečnostní*), para 49.

⁸⁸ C-393/09 *Bezpečnostní*, Opinion of AG Bot, para 76.

⁸⁹ *ibid*, para 77.

⁹⁰ Case C-833/18 *SI, Brompton Bicycle Ltd v Chedech/Get2Get* [2020] ECR I-461 (hereinafter, C-833/18 *Brompton*), paras 27, 33.

⁹¹ Case C-469/17 *Funke Medien NRW GmbH v Bundesrepublik Deutschland* [2019] ECR I-623 (hereinafter, C-469/17 *Funke Medien*), para 24.

43. In brief, originality emphasises the creative connection between the author and the work without regard to whether a work is “*inventive, novel, or unique*”.⁹² How humans may exercise creative choices when using AI to generate artistic output and obtain authorship status will be discussed below.

1.1.4. EXPRESSION IN THE FINAL OUTCOME – THE IDEA/EXPRESSION DICHOTOMY

44. The fourth criterion – expression – means that a mere abstract conception is insufficient to confer copyright protection. Mere ideas cannot be protected; expression means that a concept or an idea becomes real and takes an intelligible form.⁹³ However, there is no need for a work to be fixed in tangible form under EU Law.⁹⁴ Copyright law only covers the form in which certain ideas are expressed and not an unexpressed idea.⁹⁵ This different treatment of ideas and expressions – often referred to as the “idea-expression dichotomy” – is a core principle of copyright law. The underlying rationale is to prevent the monopolisation of ideas through copyright law. The principle was developed to balance authorship rights and the public interest of having access to ideas and principles which could result in technical and industrial progress.⁹⁶
45. While the concept is comprehensible, it is sometimes difficult to strictly separate the idea from its expression.⁹⁷ For example, in an English court case, a film script was found to infringe the copyright of a book on which it was based. The court held that even though the respective texts were different, the dramatic incidents described in the book constituted the originality of the work.⁹⁸ However, German courts ruled against copyright infringement in a similar case involving fictional characters. Germany's highest court ruled that using the fictional character Pippi Longstocking, created by the famous children's author Astrid Lindgren, does not violate copyright law if some “external” features of the character are adopted.⁹⁹ This shows how difficult

⁹² Lionel Bently and others, *Intellectual Property Law* (5th edn, Oxford University Press 2018) 93.

⁹³ Antoine Latreille, ‘From idea to fixation: a view of protected works’ in Estelle Derclaye (ed) *Research Handbook on the Future of EU Copyright* (2009) Edward Elgar 133, 135.

⁹⁴ Michael Walter, ‘Grundriss des österreichischen Urheber-, Urhebervertrags- und Verwertungsgesellschaftenrechts’ (2017) 17f.

⁹⁵ Simon Stokes, *Art and Copyright* (2nd edn, Hart Publishing 2012), 5f; Latreille (n 93) 134.

⁹⁶ Ed Barker and Iona Harding, ‘Copyright, the ideas/expression dichotomy and harmonization: digging deeper into SAS’ (2012) *Journal of Intellectual Property Law & Practice* 673, 675; C-833/18 *Brompton*, para 27.

⁹⁷ Barker/Harding (n 96) 675; *Hodgson and Jarvie v Isaac and Notting Hill Movies Ltd* [2010] EWPCC 37.

⁹⁸ Barker/Harding (n 96) 676.

⁹⁹ Birgit Clark, ‘Freckles on her nose, diddle diddle dee’: copyright protection of a literary figure’ (2013) *Journal of Intellectual Property Law & Practice* 817.

it is to draw the line between what is still covered by copyright and what is no longer. In the words of Mongillo, the fundamental rule of the inability to protect ideas “*is probably the easiest to state and the hardest to apply*”.¹⁰⁰

46. In cases where ideas and their respective expression are so closely tied to another, i.e., where an idea can only really be expressed in one way, protection is usually not granted by copyright as the protection of the expression would conversely result in the undesirable protection of an idea.¹⁰¹ In EU copyright law, this principle is seemingly tied to the so-called “technical exclusion”, which provides that there is no originality where “*different methods of implementing [a technical] idea are so limited that the idea and the expression become indissociable*” (see paras 41f).¹⁰² These cases that exclude the protection of general technical ideas from copyright protection are clearly in line with the rationale behind the different treatment of ideas and expressions. However, it is questionable whether the same principle is pertinent in AI-generated works (see below).
47. In some forms of contemporary art – i.e. objets trouvés or appropriation art (see below para 99) – the ideas are central and the relevance of the expression is thus often criticised – some even call for the abolition of this requirement for copyright.¹⁰³ The following elaborations will show that the idea/expression dichotomy may also pose a hurdle for the protectability of AI-generated works. The difficulty of defining a strict line between idea and expression is often a focal point of critique and should probably be relaxed regarding AI-generated works.¹⁰⁴

1.2. AUTHORSHIP AND THE ROLE OF ASSISTANTS

48. In addition to the expression requirement, it is essential to point out that EU copyright law does not require personal execution for a work to be original.¹⁰⁵ An author may make use of technical tools or assistants to express ideas.¹⁰⁶ If a third person merely implements the idea of an author, the latter will not necessarily earn authorship or co-authorship.¹⁰⁷ According to Ginsburg,

¹⁰⁰ Roberta Mongillo, ‘The idea-expression dichotomy in the US and EU’ (2016) EIPR 733, 5.

¹⁰¹ *ibid*, 2.

¹⁰² Daniel Inguanez, ‘A Refined Approach to Originality in EU Copyright Law in Light of the ECJ’s Recent Copyright/Design Cumulation Case Law’ (2020) IIC - International Review of Intellectual Property and Competition Law 797, 805; C-393/09 *Bezpečnostní*, para 49.

¹⁰³ Walravens (n 4) 186f.

¹⁰⁴ W. R Cornish, David Llewelyn and Tanya Frances Aplin, *Intellectual Property: Patents, Copyright, Trade Marks And Allied Rights* (Sweet & Maxwell 2013) 12-06f.

¹⁰⁵ Walravens (n 4) 179.

¹⁰⁶ Guido Kuscko and Christian Handig, *urheber.recht² systematischer kommentar zum urheberrechtsgesetz* (Manz 2017) §1 para 16.

¹⁰⁷ Ginsburg/Budiardjo (n 50) 360.

“*authorship places mind over muscle*” and “*mind over machine*”, and the author is the person conceptualising and directing the development, not the assistant who merely executes instructions.¹⁰⁸ Copyright protection is not precluded if the artist gives precise instructions to his assistant, who then carries them out without deviation.¹⁰⁹

49. More importantly, the assistant does not become the author by merely carrying out instructions. Only if assistants influence the output with their own creative choices might they be eligible for co-authorship. However, the authorship of the instructor does not necessarily cease to exist. Where a contribution to a work does not involve sufficient creative choices to meet the originality condition, there can be no copyright.¹¹⁰
50. In line with Ginsburg/Budiardjo, an appropriate approach towards AI creations may be to consider them as tools and/or assistants of the human author.¹¹¹ The below analysis will show that a strict application of this approach would, however, likely preclude most AI-generated works from copyright protection. This and the apparent irrelevance of personal execution may raise the question of whether copyright should focus more on the protection of ideas, especially concerning AI-generated works (see below).¹¹²

1.3. ALEATORIC ELEMENTS

51. A further important factor for treating AI-generated works is how EU copyright handles aleatoric (random) elements in creating works. Generally, works solely generated by a random generator are excluded from copyright protection. However, using some random elements by the author does not automatically preclude copyright protection.¹¹³ Elements of randomness are nothing new to copyright law, which deals with aleatory elements in works of art such as sculpture or watercolour painting that are dependent on unpredictable elements mainly due to the nature of the used material.¹¹⁴

¹⁰⁸ Jane C-Ginsburg, 'The Concept of Authorship in Comparative Copyright Law' (2003) 52 DePaul L Rev 1063, 1072, 1074.

¹⁰⁹ Walravens (n 4) 179.

¹¹⁰ Bently (n 92) 167f

¹¹¹ Ginsburg/Budiardjo (n 50) 403.

¹¹² Walravens (n 4) 182.

¹¹³ Jannis P. Dietrich, 'Augmented Reality-Umgebungen im Urheberrecht' (Dr.iur. thesis, Humboldt Universität zu Berlin 2020) 119; Albes (n 73) 76; Ginsburg/Budiardjo (n 50) 362; Grätz (n 10) 81; Natalie Löw, 'Der Schutz ausübender Künstler bei musikalischen Darbietungen im deutschen und englischen Recht' (Dr.iur.thesis Justus-Liebig-Universität Gießen 2009) 30.

¹¹⁴ Albes (n 73) 76.

52. Combining random elements with conscious design decisions may lead to the copyrightability of works containing aleatoric elements. Merely triggering a creative process which is entirely random will not suffice.¹¹⁵ Some consider, albeit unconvincingly, that deciding to use a random generator constitutes a creative act.¹¹⁶ However, the exact threshold at which the degree of randomness still justifies copyrightability is as difficult to determine as the exact degree of necessary human involvement and, therefore, cannot be generalised.¹¹⁷
53. Following Hugenholtz, a generalisation may be better formulated in a way that copyrightability requires “*general authorial intent*”.¹¹⁸ Meaning that authors must have a “*general conception of the work before it is expressed, while leaving room for unintended expressive features*”.¹¹⁹ Decisive is that the artist still has a central influence on the concrete form – the expression – of the work.¹²⁰ Similarly, Gomille intends to define three criteria that should be considered when using random generators.¹²¹ First, the human artist should undertake to develop the basic pattern. Secondly, the generative process has to create output with sufficient creativity (originality). Thirdly, the artist must be able to decide on the deployment of the machine and the selection of output.
54. The use of random elements - a reality of modern art - poses a challenge to the traditional concept of the original work.¹²² While some chance elements do not preclude copyrightability, it is safe to say that the more the creation of works is based on random elements, the less likely it will be copyrightable.¹²³

1.4. CONCLUDING REMARKS

55. In the section above, I outlined the decisive principles for establishing copyright protection for AI-generated works. Equipped with the knowledge of these principles, the following section will discuss avenues that could lead to copyright protection of AI-generated works. I will show that the main difficulties and decisive points for copyrightability of AI-generated works are not new

¹¹⁵ *ibid.*

¹¹⁶ Grätz (n 10) 81.

¹¹⁷ Ginsburg/Budiardjo (n 50) 363.

¹¹⁸ Hugenholtz/Quintais (n 66) 1200.

¹¹⁹ *ibid.*

¹²⁰ Sven Hetmank and Anne Lauber-Rönsberg, ‘Künstliche Intelligenz – Herausforderungen für das Immaterialgüterrecht’ (2018) GRUR 574, 577.

¹²¹ Grätz (n 10) 81; Christian Gomille, ‘Kreative künstliche Intelligenz und das Urheberrecht’ (2019) JZ 969, 972.

¹²² Walravens (n 4) 173.

¹²³ Dietrich (n 113) 119.

to EU copyright law. Drawing on these discoveries I will further suggest that a relaxation of the idea/expression dichotomy specifically for AI-generated works could be a reasonable solution to the AI copyright dilemma.

2. APPLICATION TO AI-GENERATED WORKS

56. In the following section, I will explore potential approaches to the copyrightability of AI-generated works – in particular, the output of text-to-image synthesis models like WOMBO and DALL E. In the first part, I will describe the stages of creation in AI-generated works in which human authors can make creative decisions. In the second part I consider the developers of AI systems as potential authors. Thereafter I will look at approaches for users of AI systems to obtain author status. The fourth part will evaluate the consideration whether merely selecting and presenting AI output could be sufficient to establish copyright. Finally, before concluding, I will briefly discuss the relevance of legal presumptions of authorship.
57. The discussion will highlight the difficulties in establishing copyright for AI-generated works and propose possible solutions to the AI copyright dilemma that would allow for copyrightability without radically changing the EU copyright regime.

2.1. GENERAL CONSIDERATIONS FOR THE COPYRIGHT OF AI-GENERATED WORKS

58. The arguably aesthetic value of WOMBO and DALL E creations is irrelevant for establishing originality under EU copyright law. Whether the user of a text-to-image model is the author of the creation depends on their ability to make free and creative choices (see above “originality”). This freedom of creative choices presupposes some human involvement, regardless of opinions calling into question the freedom of human choices due to social, technical or institutional constraints.¹²⁴ However, compared to AI – which for the time being is incapable of making free and creative choices outside its given algorithm – humans are considered capable of intrinsic inspiration.¹²⁵ Since technical rules or constraints cannot determine creative choices, a human author must satisfy the criterion of creative choices (see para 37).¹²⁶

¹²⁴ Ana Ramalho, ‘Will Robots rule the (artistic) world? A proposed model for the legal status of creations by artificial intelligence systems’ (2017) *Journal of Internet Law* 8.

¹²⁵ *ibid.*

¹²⁶ *ibid.*

59. The *Painer* judgment sets out how and in what stages human authors may exert creative choices when deploying technical aids and is therefore instructive for AI-generated works. The case concerned the originality of mundane portrait photographs. The court pointed to various stages in the creation of these seemingly ordinary photographs where a photographer could exercise free and creative choices and thereby stamp the work with his ‘personal touch’.¹²⁷ From the ruling, it can be deduced that a photographer can make creative choices in (1) the conception/preparation, (2) the execution and (3) the redaction phase.¹²⁸
60. Accordingly, the ECJ held that the photographer might choose the background, pose, and/or lighting in the preparation or conception phase.¹²⁹ The conception of a work goes beyond the mere development of an idea.¹³⁰ This phase entails conceptualising and envisioning the work by, for example, selecting the subject matter, the intended tools, etc.¹³¹ In the case of generative AI deployed as tools, human involvement at this stage may involve the choice of subject matter and design style, the choice of AI system, and the selection of necessary input data.¹³² However, these choices largely depend on the AI's settings and subsequently on its developers' decisions. Developers may also drastically limit the creative choices of users in the prompting stage.¹³³ Before user deployment, the developers have the most creative freedom when developing the AI system.
61. In the execution phase, the ECJ held in *Painer* that the framing, angle of view, and atmosphere depend on the photographers’ choice to handle the camera.¹³⁴ Here, the question is whether advanced AI systems can still be considered tools comparable to cameras. Due to the limited room for creative choice left by advanced AI models, the importance of the traditionally crucial execution phase has faded into the background when determining copyrightability.¹³⁵ Ironically, it almost seems as if the roles are reversed with sophisticated AI models, i.e., the AI that cannot prompt itself seems to use humans to generate output.

¹²⁷ C-145/10 *Painer*, para 92.

¹²⁸ Hugenholtz/Quintais (n 66) 1201.

¹²⁹ C-145/10 *Painer*, para 91.

¹³⁰ Hugenholtz/Quintais (n 66) 1202.

¹³¹ *ibid.*

¹³² *ibid.*

¹³³ Ginsburg/Budiardjo (n 50) 417f.

¹³⁴ *ibid.*

¹³⁵ Hugenholtz/Quintais (n 66) 1203.

62. In the redaction phase, the ECJ considered choices from various developing techniques and the potential use of computer software as creative leeway.¹³⁶ However, regarding AI-generated works that are ready to use, human involvement may not go beyond selecting or discarding AI-generated output (see para 97ff).¹³⁷
63. According to *Painer*, the choices in these three phases allow an author of a work to give it a “personal touch”.¹³⁸ Although the court appears to require the possibility of free and creative choices at all these stages, it is not necessary for copyright to have and use creative latitude to the same degree during all three phases. In practice, the three phases complement and influence each other and may not equally contribute to the originality of the final output.¹³⁹ Generally, the conceptional phase is usually given the most weight when determining originality for copyright (see paras 48ff).¹⁴⁰ The AI may be regarded as the assistant of a human author who defines the instructions. The more detailed the instructions to the AI, the more a form of conceptualising the outcome is possible. The fewer creative choices are left to the element of chance; the likelier is the creation of copyrightable works. According to Hugenholtz, “*general authorial intent is probably*” sufficient, and the author does not need to preconceive “*all expressive features*”.¹⁴¹ Where an “*attributable connection between the creative process and the expression*” is present, the copyright for AI-generated works is held to be at least feasible.¹⁴² As outlined above, certain aleatoric elements do not preclude copyright protection.
64. These general considerations will be scrutinised in the following paragraphs in addressing whether the authorship of AI-generated works is more likely to rest with the developers or users of trained generative AI models.

2.2. DEVELOPERS AS AUTHORS

65. Given the indispensable role of human developers in creating trained generative machine learning models, it is appropriate to consider them as potential authors of AI-generated works. Little controversy seems to exist regarding authorship claims of programmers to the underlying

¹³⁶ *ibid.*

¹³⁷ *ibid.*, 1204.

¹³⁸ C-145/10 *Painer*, para 92.

¹³⁹ Hugenholtz/Quintais (n 66) 1205.

¹⁴⁰ *ibid.*

¹⁴¹ *ibid.*, 1199, 1200.

¹⁴² *ibid.*, 1200.

code.¹⁴³ However, authorship for AI-generated works is hotly debated and rather unlikely in the case of WOMBO and DALL-E creations.¹⁴⁴ In many instances programmers will instead remain the “*author of the author*”.¹⁴⁵

66. As outlined in the technical introduction, developers have considerable influence in various stages of creating machine learning models – from programming the initial algorithm to selecting datasets in the training process. According to Ginsburg/Budiardjo, developers of machines that generate output without any further external creative input qualify as authors of such output even when they had little conception of the resulting output.¹⁴⁶ Arguably, regardless of any predictability – AI-generated works always directly stem from the model’s processes which are the “*brainchild of some human developer or user*”.¹⁴⁷ Without a doubt, developers are causal for creating AI-generated works. However, such a conclusion would forego that even an intentional use of randomness may disqualify copyrightability where the originality threshold is not met.
67. The mere selection of datasets for training a model is most likely insufficient for establishing originality. This process can be compared to having an idea or creating a particular style – both of which cannot be protected by copyright law (see paras 44ff).¹⁴⁸ Gomille sees no obstacle for developer authorship where developers individually design the content of the datasets from which the model then learns and where new output is generated solely from these datasets.¹⁴⁹ Grätz rightly criticises this approach. He argues that the problem of humans not being involved in the execution phase of AI-generated works remains, irrespective of the content of a dataset.¹⁵⁰
68. Authorship for AI-generated works is conceivable where the model leaves no creative choices for its users. Arguably, developers would have to program the AI in a way that minimises the element of unforeseeability of the created output. In setting up the underlying rules of a machine learning model and limiting its random elements developers could arguably exercise creative choices.¹⁵¹ The programmer sets the framework and then leaves it to chance what the AI does

¹⁴³ Martin Sanftleben and Laurens Buijtelaar, ‘Robot creativity: an incentive-based neighbouring rights approach’ (2020) E.I.P.R. 797, 16.

¹⁴⁴ Albes (n 73) 77.

¹⁴⁵ Sanftleben/Buijtelaar (n 143) 15.

¹⁴⁶ Ginsburg/Budiardjo (n 50) 417.

¹⁴⁷ *ibid*, 398.

¹⁴⁸ Albes (n 73) 76.

¹⁴⁹ Grätz (n 10) fn 914; Gomille (n 121) 973.

¹⁵⁰ Grätz (n 10) fn 914.

¹⁵¹ Sanftleben/Buijtelaar (n 143) 10.

with it (see paras 51f).¹⁵² It is similar to the poured paintings of the Austrian artist Hermann Nitsch who became famous for pouring buckets of red paint on a white canvases and leaving it to chance how the painting would then look.¹⁵³ Nitsch is generally considered the author of his poured paintings.¹⁵⁴ There is no apparent reason why the developer of an AI that happens to create something within a given framework - similar to a narrow framework given by pouring a bucket of paint onto a canvas - should not be granted copyright simply because AI performs the execution. The difference should not be tied to the physical act of pouring paint. Such a view, as proposed by Zankl, bears similarity to Section 9(3) of the UK's Copyright, Designs and Patent Act which regulates the copyrightability of Computer-generated works.¹⁵⁵ In the UK, the author of a computer-generated work “*shall be taken to be the person by whom the arrangements necessary for the creation of the work are undertaken*”.¹⁵⁶ However, in light of the EU's originality standard, it is questionable whether developers have made the necessary arrangements when the creative framework is significantly larger than in Nitsch's paintings - which is arguably the case for most AI-generated works.

69. Nonetheless, developers may further achieve authorship status by collaborating with users to generate specific output.¹⁵⁷ Developers can influence the execution phase of AI-generated works by instructing the machine learning models on how to process data. However, where output generation depends on unforeseeable creative input data from users (prompts) – as in WOMBO and DALL-E – developers are unlikely to claim authorship due to the lack of a complete creative plan.¹⁵⁸ If AI systems are effectively tools in the traditional sense, copyright for their developers is unthinkable, much like Microsoft Word programmers do not incur copyright for all text written with it.¹⁵⁹
70. If developers intentionally include too many random elements in the creation process, they may disqualify themselves as potential creators of AI-generated works. If the output is so unexpected that the generative model is effectively a random generator, it is unlikely that copyright will arise for the developer.¹⁶⁰ Unless the data processing of a machine learning model is meticulously

¹⁵² Wolfgang Zankl, 'Künstliche Intelligenz und Immaterialgüterrecht bei Computerkunst (2019) ecolex 244, 246

¹⁵³ *ibid.*

¹⁵⁴ *ibid.*

¹⁵⁵ *ibid.*

¹⁵⁶ Copyright, Designs and Patents Act 1988, Section 9(3).

¹⁵⁷ Hugenholtz/Quintais (n 66) 1209.

¹⁵⁸ Ginsburg/Budiardjo (n 50) 424, 435.

¹⁵⁹ *ibid.*, 426.

¹⁶⁰ Albes (n 73) 76.

adjusted to meet specific creative intentions. The role of developers in creating works generated by generative machine learning models can be compared to that of an art teacher in the works of his students.¹⁶¹ Comparable to a teacher, the developer merely teaches the model how to create but does not exercise sufficient creative choices in the creation of final output to claim copyright authorship.¹⁶²

71. Applying the above considerations to output generated with WOMBO or DALL-E, it is inconceivable to grant the developers authorship status for works generated with these systems. First, users may play a decisive – arguably creative – role in output generation. Secondly, when works are generated with unsophisticated and very general prompts, the element of the randomness of the creation is arguably too high and the developer's authorial intent too low for originality.

2.3. USER AS AUTHOR

72. The second group of authorship contestants are the users of AI systems such as WOMBO and DALL-E. The term user may cover all human beings that provide the necessary input or step for an AI system to generate works. User authorship greatly depends on the extent of creativity that goes into this initialising event. The crucial question is how a user can make free and creative choices and to what extent the result of an AI system cannot be equated with the result of a random generator. In text-to-image synthesis, the text input is the most obvious point at which the user can make creative decisions. This is probably the only point if one does not consider the selection process to be sufficiently creative, as is the prevailing academic opinion (see paras 97ff).
73. Considering the great importance of the prompt, the conceptual phase is undoubtedly the most important phase for establishing copyright for a user. AI systems like DALL-E, which aim to create accurate visualisations based on a user's textual descriptions, are more likely to enable traceable conceptualisations than WOMBO. Rather than following precise instructions, WOMBO arguably leaves too many creative decisions to chance (see image in the introduction).
74. AI systems leave no room for direct human involvement in the execution phase. The user may well influence what a machine will create, but those instructions may not influence (enough)

¹⁶¹ Sanftleben/Buijtelaar (n 143) 11.

¹⁶² *ibid.*

how the machine creates.¹⁶³ However, meticulously drafted prompts may be held to be executed by an “artificial assistant”, thereby giving the human user the chance to execute his creative concept indirectly.

75. Lastly, while direct output generated by WOMBO or DALL-E leaves no room for human redaction, apart from selecting and discarding output, the generated works may form the basis of a copyrightable derivative work.¹⁶⁴
76. The following subchapters will scrutinise these considerations more thoroughly. Given that AI systems are not (yet) acting autonomously, these considerations are based on the premise that AI systems are used as creative tools that contain elements of randomness that can be controlled by the textual prompt. I will conclude that the solution for AI-generated works that is most consistent with current copyright law may require relaxing the principle that ideas are not protected for AI-generated works.

2.3.1. THE “ARTIFICIAL ASSISTANT” – PROMPT AS INSTRUCTION

77. As established above, the conceptualisation phase has great weight in AI-generated works. Someone who merely carries out the strict instructions of an artist will not make enough creative choices to become a co-author, let alone an author. Conversely, authorship is not lost when artists use third parties as assistants to express themselves indirectly. Since there is no human assistant requirement in copyright law, it is not inconceivable to establish authorship for a user of an AI system if it can be shown that the AI merely played the role of an “artificial assistant”.
78. Such considerations are not new. Glen Cheng discusses the implications for derivative works of cases in which authors “*compose visual art in prose*”.¹⁶⁵ In the case of instructions that leave little to no creative freedom to the person who physically creates the textually described work, Cheng believes it is unlikely that separate copyrightability can exist as a derivative work.¹⁶⁶ Other “instructive works,” on the other hand, may allow performers enough creative freedom in interpretation to establish their own copyright.¹⁶⁷ He further cites the work of Sol LeWitt, who created written instructions “*to guide others in making his artwork*”, thereby instrumentalising

¹⁶³ Ginsburg/Budiardjo (n 50) 428.

¹⁶⁴ Hugenholtz/Quintais (n 66) 1204.

¹⁶⁵ Glen Cheng, ‘The Aesthetics of Copyright Adjudication’ (2012) UCLA Entertainment Law Review, 19(1) 113, 123.

¹⁶⁶ *ibid*, 123f.

¹⁶⁷ *ibid*, 124.

the person executing the instructions.¹⁶⁸ Written instructions may be separately copyrightable, and the subsequently created work would give rise to separate copyright only if assistants can exercise "*interpretive creativity*."¹⁶⁹ However, if there is no creative leeway and any possible remaining leeway can be interpreted as the purposeful use of random elements, it is not inconceivable that the author of the instructions can also be considered the author of the final result.¹⁷⁰

79. For copyright to arise with the help of an artificial assistant, the user must formulate the prompt in a way that leaves little to no creative decision-making to the arguably random - because unpredictable - processes of the AI models. When elements of randomness can be reduced to a minimum, copyright is feasible – at least theoretically. However, this would require very sophisticated text-to-image models. Despite the significant technological developments, there might not yet exist an AI model that lives up to these high expectations. Experience reports of users with DALL-E 2 – currently one of the most advanced systems – indicate that the model often cannot follow precise instructions.¹⁷¹
80. The decisive factor for copyright via an artificial assistant is the level of randomness. Randomness may preclude copyright in three ways. First, the technical limitations of an AI model may leave too many creative decisions to chance, even if the textual prompt is arguably descriptive and specific enough that a human assistant could not deviate from it. Arguably, this may be the case for WOMBO creations. Secondly, giving detailed instructions to an artificial assistant requires knowledge of how specific AI-models process textual input. Arguably, only sufficient knowledge enables users to provide instructions and limit random elements. A sufficiently deterministic prompt for a human could even be held to leave too many elements to randomness when processed by an AI system without prior experience with the model. Thirdly, the prompt itself may not be construed specific enough and leave too many decisions up to randomness.¹⁷² This may be due to human error or the default setting of the AI model. Again, it

¹⁶⁸ *ibid.*

¹⁶⁹ *ibid.*

¹⁷⁰ Richard Chused, 'Temporary Conceptual Art: Property and Copyright, Hopes and Prayers' (2019) 45 Rutgers Computer & Tech LJ 1, 23ff, 27.

¹⁷¹ Aaron Hertzmann, 'Give this AI a few words of description and it produces a stunning image – but is it art?' (*The Conversation*, 10 June 2022) <<https://theconversation.com/give-this-ai-a-few-words-of-description-and-it-produces-a-stunning-image-but-is-it-art-184363>> accessed 12 July 2022.

¹⁷² Bently (n 92) 147.

seems unlikely that Wombo allows sufficiently deterministic prompts, since the AI system only allows prompts with a maximum of 80 characters.

81. Copyright may thus only be achieved where the AI-generated work clearly and comprehensively reflects the underlying prompt. The described randomness issues may render this a merely theoretical approach. The main drawback of an artificial assistant is that users of AI systems have no way to control the model while it processes the given instructions. Furthermore, the AI systems in question do not request feedback or clarification when detecting ambiguities in the prompt. Given these complications, most AI-generated works would likely not be copyrightable based on this approach. Due to the existing interpretational leeway, the prompt instructions would not rise above the threshold of unprotectable ideas.¹⁷³
82. In summary, if perfect text-to-image synthesis becomes a reality, a carefully composed prompt will most likely be sufficient to establish authorship over the work generated by the AI. For the time being, AI-generated works would probably require a relaxation of the principle of the unprotectability of ideas. Considering that some elements of chance do not exclude copyright, and some argue that the general intent of the author is sufficient, a European court could recognise copyright through the artificial assistant approach.¹⁷⁴ However, this approach would unlikely protect works based on prompts which consist of seemingly random strings of words, characters and/or symbols. The copyrightability of such works will be discussed in the following subchapters.

2.3.2. ORIGINALITY THROUGH EXPERIMENTATION

83. The above considerations concern situations in which AI-generated works may be copyrightable if the input prompts contain human-understandable instructions and even if they are executed only once. The output is arguably less predictable when running a prompt for the first time than after experimentation with a model by running prompts multiple times. By observing how the models process certain prompts, users can adjust those prompts accordingly, allowing them to make creative decisions that justify authorship of the final output generated by the AI.¹⁷⁵ This experimental process often leads to seemingly random prompts.¹⁷⁶

¹⁷³ Ginsburg/Budiardjo (n 50) 444.

¹⁷⁴ Hugenholtz/Quintais (n 66) 1200.

¹⁷⁵ Hertzmann (n 171).

¹⁷⁶ *ibid.*

84. Artistic and creative processes are often based on experimentation. Artists regularly do not have a plan or idea of what they want to express and only discover it during the creational process. Such creative approaches – i.e. improvised music – are, however not categorically precluded from copyright protection.¹⁷⁷ Traditional art forms benefit from the wide range of creative possibilities in the execution phase of a work. While this is not possible with AI-generated works, the reaction to AI output by adaptation of the prompt and thereby intentionally directing the AI model may be regarded as comparable creative expression according to EU copyright law.
85. However, it is difficult to generalise what degree of experimentation is required to transform a non-copyrightable, randomly generated result into a copyrightable work. How does a prompt need to be run until a work is considered copyrightable? However, since the European originality standard is not very high and even encompasses arguably trivial works, a user could likely be granted copyright in this way.¹⁷⁸ The practical difficulty will lie in distinguishing original works resulting from the exercise of creative experimentation from randomly generated but arguably aesthetically pleasing output, the selection of which unlikely suffices for copyright (see paras 97ff). Arguably, only a documented creation process could make the existence of a copyrighted work credible, so it is a matter of evidentiary proof (see, paras 105f).

2.3.1. PROMPT DERIVED ORIGINALITY

86. As stated above, the prompt is the crucial element in creating text-to-image AI works that allow users to express their creativity. For copyright, the question thus arises whether the creativity that went into creating the prompt, which served the sole purpose of prompting output by an AI model, can or should spill over to the final output and grant the prompter copyright in the AI-generated work. Those who argue that the uprise of such AI models effectively leads to the emergence of a new form of art - “prompt-based-image-making” or “promptism”- would welcome such a step.¹⁷⁹
87. Generally, copyright law does not extend the originality of one work to a derived work – the latter must separately meet the standard of originality.¹⁸⁰ Concerning the interdependence between prompt and final output, it may be worth considering the contrary. This would recognise

¹⁷⁷ Walter (n 94) 18; Kuscko/Handig (n 106) § 1, para 25.

¹⁷⁸ Walter (n 94) 13f.

¹⁷⁹ Hertzmann (n 121); johanezz, The Promptist Manifesto (*dl.ART*, 27 August 2021) <<https://deeplearn.art/the-promptist-manifesto/#>> accessed 25 July 2022.

¹⁸⁰ Hetmank/Lauber-Rönsberg (n 120) 577; Bently (n 92) 147.

the creative choices that can be exercised when creating prompts which serve the sole purpose of being processed by a specifically selected AI model. It can be said that there is something like a special connection between a creatively drafted prompt and the generated result, which should be the basis for the author of the prompt to obtain copyright in a work generated by an AI.

88. Under current EU copyright law, the prompts in isolation may qualify for copyright as long as they do not consist of single words.¹⁸¹ In *Infopaq*, the ECJ held that isolated sentences, or even parts thereof, in a text may convey the originality of a publication by communicating an “*element which is, in itself, the expression of*” the author's intellectual creation.¹⁸² Single words are not copyrightable, but an intellectual creation may be achieved as the result of a “*choice, sequence and combination of those words*”.¹⁸³ The single words become in a way inseparable from the original work. Also, since there is no need for creative choices to be rational, even seemingly random prompts may satisfy the originality standard of the ECJ.¹⁸⁴
89. The same consideration is valid for AI-generated works and their underlying prompts. Notwithstanding that a prompt may be original in itself, the specific purpose of the prompt for processing by an AI model may be considered an indispensable combination to achieve overall originality. The idea is that prompt and output are two inseparable elements that together constitute overall originality. Since the prompt is drafted precisely for this purpose, one might even argue that its originality depends on the creative ideas that a user envisions in the final outcome. In a way, output and prompt derive their originality from each other reciprocally. The AI-generated work would not exist without the prompt. Conversely, the prompt may be considered comparatively unoriginal, such as individual words in a sentence, if the sole purpose of the prompt is to prompt an AI-generated work. Potentially, recognising the prompt and final output as inseparable elements of AI-generated works could be the beginning of recognising AI-generated works in copyright law. Emphasising the originality of a prompt would accept the reality of AI art and provide a solution that arguably rewards creative AI prompters who can make enough creative decisions at this stage to stamp the AI output with their “personal touch”.¹⁸⁵

¹⁸¹ C-05/10 *Infopaq*, para 45.

¹⁸² *ibid*, para 47.

¹⁸³ *ibid*, para 45.

¹⁸⁴ Bently (n 92) 101.

¹⁸⁵ C-145/10 *Painer*, para 92.

90. This would probably be an overstretch and misapplication of the *Infopaq* decision. Moreover, these considerations seem to contradict the idea/expression dichotomy (see paras 44ff). The rationale behind this principle is to exclude expressions from copyright protection to avoid the inherent protection of ideas that cannot be expressed otherwise. In EU law, however, this seems to refer predominantly to technical ideas which should not be protected by copyright.
91. However, the prompt for an AI-generated work is not comparable to an idea that should be prevented from monopolisation. First, significant creative choices can be made to structure and conceive an “idea”. Second, a prompt is not like a technical idea such as a foldable bicycle (see para 41).¹⁸⁶ Thirdly, the content of the “idea”/prompt often largely depends on how an AI-model processes data. In a way, prompt and AI model are interdependent, and the creative choices exercised when drafting a prompt may be significantly influenced by the functionality of the AI-model (i.e. only permitting 80 character strings in WOMBO). Therefore, the exclusion of copyrightability based on the unprotectability of ideas does not seem appropriate for AI-generated works.
92. Acceptance of AI-generated works as another possible form of human art, where originality is derived from the prompt, may lead to copyright within the originality standard and without drastic change or adjustment of basic principles. For example, unoriginal prompts consisting of merely one word would not lead to copyright protection (see paras 38ff).¹⁸⁷ Only a slight relaxation of the protection of ideas might be necessary. Considering the difficulty of drawing the line between idea and expression – courts seem to have some leeway in applying this basic principle – this solution is quite conceivable.
93. Ultimately, however, regardless of a relaxation of the principle of the unprotectability of ideas, the elements of randomness may still pose a hurdle for copyright protection. Whether these elements preclude copyright will always depend on a case-by-case assessment.

2.3.1. CONCLUSION AND CONSOLIDATION

94. First, where prompts are comprised of a comprehensible text but cannot be regarded as perfect instruction (“artificial assistant”), there are two feasible approaches for user copyright. One option would be to grant copyright by acknowledging the creativity of the underlying idea. This

¹⁸⁶ C-833/18 *Brompton*.

¹⁸⁷ C-05/10 *Infopaq*, para 45.

might require an arguably justified relaxation of the idea/expression dichotomy with regard to AI-generated works. Similarly, it might be justified to relax the requirements for the “artificial assistant” approach with regard to the instructions.

95. Related to these considerations is the idea of deriving originality of the AI-output from an original prompt. Such an approach would acknowledge the immense importance of prompting in an arguably new artform and would also require a reconsideration of the idea/expression dichotomy in light of the peculiarities of AI-generated works. It could extend copyrightability to works that do not meet the assistant threshold – when a prompt is not understandable by humans. However, it would arguably also require reconsidering and relaxing the originality standard specifically for AI-generated works by recognising that prompt and output are inseparable elements of AI-generated works that owe their respective originality to each other.
96. Lastly, where prompts neither meet the originality standard nor an even reduced level of specificity, the experimentation approach may still be a viable option to establish user authorship. With all these approaches, documentation of the creative process is crucial. Otherwise, courts may be reluctant to establish copyright, fearing that these approaches provide a backdoor for randomly generated results to gain copyright status.

2.4. COPYRIGHT THROUGH SELECTION AND PRESENTATION OF THE OUTPUT

97. If neither the copyright of a user nor that of a developer can be established, it is possible to consider the person as the author who selects the results produced by the AI and presents them as art. The idea behind this approach is to consider the selection of something and its elevation to the status of art as a sufficient expression of creativity for originality.
98. Some consider conscious choosing of works created by a random generator to trigger copyright protection.¹⁸⁸ A proponent of this so-called presentation theory is Max Kummer.¹⁸⁹ His view is arguably to be rejected because it links copyrightability to output alone and, moreover, places the protectability of a work at the individual's disposition in a manner inconsistent with copyright law.¹⁹⁰ Others try to defuse Kummer's presentation theory by merely applying it to a selection

¹⁸⁸ Deutscher Bundestag - Wissenschaftliche Dienste, „Künstliche Intelligenz und Machine Learning, Eine urheberrechtliche Betrachtung“ (2018) Ausarbeitung WD 10-3000-67/18, fn 71. Hugenholz/Quintais (n 66) 1204.

¹⁸⁹ Albes (n 73) 75.

¹⁹⁰ *ibid.*

among various outputs.¹⁹¹ However, there seems to be little to no difference between merely selecting one option and elevating it to art.¹⁹²

99. The discussion emanates from a long-existing discussion in copyright law involving the copyrightability of conceptual art – in particular, ready-mades or objets trouvés. Often cited examples include the readymade sculpture “Fountain” – consisting of a signed ceramic urinal – by Marcel Duchamp, which has sparked discussions since its “creation” in 1917.¹⁹³ The originality of such works is claimed to be based on the fact that the object in question is exhibited in an artistic context.¹⁹⁴ The designation process in itself is considered to constitute the work.¹⁹⁵ Ever since Duchamp first presented his controversial sculpture, there were voices in the legal art world who wanted to see the abolishment of the “idea/expression dichotomy”, thereby offering protection to ideas and not only the form in which they are expressed.¹⁹⁶ Copyright is called upon to acknowledge the reality of art which is that mere ideas are held to constitute works of art.¹⁹⁷
100. Whether an artist may stamp a work with his personality by merely selecting a piece of art is highly questionable. In the case of selecting AI-generated works, it might even be difficult to identify and specify a protectable idea in the same way as with items of daily use that are granted artistic status. Arguably, even if copyright were granted to conceptual art, this would thus not solve the copyright dilemma for AI-generated works.
101. Granting copyright for selected AI-generated works would amount to giving copyright to ready-mades or extreme versions of so-called appropriation art, which sometimes consists of appropriating works of other artists without changing them and without attributing the authors.¹⁹⁸ Appropriation art often involves copying other works and giving them a different meaning instead of a different appearance.¹⁹⁹

¹⁹¹ Hetmank/Lauber-Rönsberg (n 120) 577.

¹⁹² Albes (n 73) 76.

¹⁹³ Kelly Grovier, *The urinal that changed how we think* (*BBC Culture*, 11 April 2017) <<https://www.bbc.com/culture/article/20170410-the-urinal-that-changed-how-we-think>> accessed 30 June 2022; Brian L Frye, ‘Conceptual Copyright’ (2021) 66 *South Dakota L Rev* 183, 183f.

¹⁹⁴ Stokes (n 95), 165.

¹⁹⁵ Walravens (n 4) 176.

¹⁹⁶ *ibid.*, 172; Stokes (n 95), 5f, 164.

¹⁹⁷ Stokes (n 95), 175.

¹⁹⁸ Markus Müller-Chen, ‘Grundlagen und ausgewählte Fragen des Kunstrechts’ (2010) *Zeitschrift für Schweizerisches Recht* 35; Johnson Okpaluba, ‘Appropriation Art: Fair use or Foul?’ in Daniel McClean and Karsten Schubert (eds), *Dear Images Art, Copyright and Culture* (Ridinghous 2002) 197, 200.

¹⁹⁹ Bently (n 92) 114.

102. Using unchanged AI-generated works as the basis of subsequent works requires some form of original alteration. Authorless works in the public domain may form the basis of so-called derivative works, meaning that the AI-generated output is used as the basis for a separate original work.²⁰⁰ However, this use of AI-generated works would not confer copyright on the underlying AI-generated works. These would remain in the public domain, ready to use by anyone, provided they still exist.
103. Further, a selection or arrangement of various AI-generated works may in itself be protected by copyright law as a “collective work”.²⁰¹ However, this also does not confer copyright on the individual AI-generated works used for the collage or collective work.²⁰²
104. In summary, the presentation theory does not seem to be compatible with copyright law. Copyright law would become redundant, as a single presenter could decide whether an object is copyrightable instead of the law.²⁰³ However, selecting AI-generated works for subsequent works does not preclude copyright protection if the alteration or arrangement meets the originality standard.

2.5. PRESUMPTION OF AUTHORSHIP

105. Given the difficulties in establishing copyright for AI-generated works, presumptions of authorship provide a useful remedy. Article 5 of the enforcement directive sets out the presumption of authorship for the artist whose name appears on the work, unless there is proof to the contrary.²⁰⁴ Where the determination of originality is a difficult balancing act between levels of randomness and human involvement, such presumptions may, in many cases, be the decisive factor in establishing copyright.
106. Initially, such provisions were thought to facilitate copyright claims of authors.²⁰⁵ In practice, the presumption of authorship will most likely constitute a fallback option for all AI-generated works where it is difficult to determine whether the threshold of originality has been met.

²⁰⁰ Grätz (n 10) 102.

²⁰¹ Article 3(1) of Directive 96/9/EC of the European Parliament and of the Council of 11 March 1996 on the legal protection of databases OJ L77/20; Austrian Copyright Act (Urheberrechtsgesetz, UrhG) BGBl. Nr. 111/1936 Section 6.

²⁰² Giulia Priora, ‘Copyright law and the promotion of scientific networks: some reflections on the rules on co-authorship in the EU’ (2019) *Queen Mary Journal of Intellectual Property* 217, 223.

²⁰³ Grätz (n 10) 75f.

²⁰⁴ Directive 2004/48/EC of the European Parliament and of the Council of 29 April 2004 on the enforcement of intellectual property rights OJ L195/16; similarly, Austrian Copyright Act (n 201) Section 12(1).

²⁰⁵ Hugenholtz/Quintais (n 66) 1210.

However, with the rise of AI-generated works, the same provision could be used in practice to attribute non-copyrightable AI-generated works to fake human authors wrongfully.²⁰⁶ Potential aid against such false copyright attribution could be found in unfair competition law. Where AI-generated works are falsely marketed as human-authored, this may constitute an illegal misleading market practice infringing unfair competition law.²⁰⁷

2.6. CONCLUDING REMARKS

107. Overall, it has been shown that it is difficult to establish a precise threshold for when an AI-generated work constitutes a copyrightable work and when it falls into the public domain like randomly generated output. For the time being, copyrightability strongly depends on a case-by-case analysis.²⁰⁸ The decisive criterion is to establish that output is not a “*product of chance*”.²⁰⁹ It has been shown how this can be attempted through various approaches. Protecting AI-generated works under copyright law would arguably be greatly facilitated by relaxing the principle that ideas cannot be protected – a relaxed originality standard for AI-generated works. This could be justified by accepting that a prompt does not constitute an idea in the traditional sense but an inseparable element of an AI-generated work that contributes to its overall originality.
108. In cases of Dall-E and WOMBO that are based on unoriginal prompts it would be advisable for the providers of these systems to waive any potential developer rights in generated output in their terms and conditions to encourage use of these systems and provide at least some form of legal certainty.²¹⁰
109. Notwithstanding the above, many AI-generated works will likely not meet the threshold of originality and thus will not be protected by EU copyright law. However, for works whose originality is difficult to establish, the presumption of authorship may be beneficial, as it will also be difficult to prove the absence of originality.

²⁰⁶ *ibid.*

²⁰⁷ Stefan Scheurer, ‘Artificial Intelligence and Unfair Competition – Unveiling an Underestimated Building Block of the AI Regulation Landscape’ (2021) GRUR International 834, 837; Grätz (n 10) fn 1488.

²⁰⁸ Albes (n 73) 76.

²⁰⁹ *ibid.*; Fabian Rack and Oliver Vetterman, ‘KI-Kunst und Urheberrecht – die Maschine als Schöpferin?’ (Telemedicus, 13 February 2019) <<https://www.telemedicus.info/ki-kunst-und-urheberrecht-die-maschine-als-schoepferin/>> accessed 2 July 2022.

²¹⁰ Such an approach was taken by the AI-based online translation program, DeepL; DeepL terms and conditions Article 7.5 <<https://www.deepl.com/en/pro-license?tab=pro>> accessed 22 July 2022.

110. In the following section, I will discuss whether copyright law should protect AI-generated works that fall into the public domain under the current copyright regime. This includes evaluating alternative means of protection, of which unfair competition law appears to be the most appropriate.

IV. SHOULD AI-GENERATED WORKS BE PROTECTED?

111. The above discussion raises the question of the justification for the difficulties encountered in attempting to obtain copyright protection for AI-generated works such as those of WOMBO or DALL-E. This section will briefly highlight the debate on whether AI-generated works should be treated more generously under EU copyright law. Whether further protection is necessary is also discussed with regard to the applicability of unfair competition law, which could fill some of the existing protection gaps in the copyright system.

1. IS THERE A NEED FOR COPYRIGHT PROTECTION?

112. Whether the unprotectability of AI-generated works under copyright law constitutes an intentional gap is unclear, as these types of works were unimaginable at the time most copyright laws were drafted.²¹¹ However, recourse to the rationales for copyright protection may help provide clarity. There are two main approaches to justify copyright protection, a natural rights justification and a utilitarian, economic justification.²¹²
113. Proponents of the natural rights justification argue that an ideational relationship between a human author and the work justifies copyright protection.²¹³ Two theories can describe this relationship. According to the labour theory, a human author should be rewarded with copyright for their invested “intellectual labour” that went into creating a work.²¹⁴ According to the personality rights theory, a work should be protected because it constitutes “*an expression of the personality of self of its creator*”.²¹⁵ The natural rights approach seems inadequate to justify copyright protection of AI-generated works in which humans have so little involvement that it is hard to see an ideational connection because most creative decisions have been left to chance

²¹¹ Scheurer (n 207) 844.

²¹² Ramalho (n 124) 14; Albes (n 73) 82.

²¹³ Albes (n 73) 82.

²¹⁴ Ramalho (n 124) 14.

²¹⁵ *ibid.*

(an AI). In my opinion, also arguments for protection based on the indistinguishability between human and AI works fall short because this would inevitably lead to a linking of copyright to arbitrary aesthetic considerations.

114. The economic incentive theory focuses on protecting the economic exploitability of works and promoting social welfare by “*granting incentives to creation*” of intellectual goods.²¹⁶ The fundamental idea is that artists who would not be able to reap the economic benefits of their works without copyright protection would cease to create new works which would, in turn, also have negative economic and cultural impacts.²¹⁷ This approach is more applicable to AI-generated works as the development of machine learning models often requires significant effort and investment. Developers who undertake these efforts want to know that their investments are protected and that they can economically exploit the generated output.²¹⁸ However, despite some legal uncertainty as to the copyrightability of AI-generated works, there does not seem to be a lack of investment and innovation. New and improved AI art generators are released weekly, and other AI-generated works have already been sold for immense amounts, i.e., the AI-generated “*Portrait of Edmond Belamy*” which sold for a staggering \$432,500.²¹⁹ These examples show that no further incentive in the form of copyright protection is necessary for the time being.²²⁰ New investment protection rights should only be implemented if there is a looming threat of market failure, which is not the case at present.²²¹
115. European copyright law tends to follow the natural law justification. For a work to be copyrightable, effort, skill, and financial investment are generally irrelevant.²²² Further, the analysis of the originality standard has shown that current copyright law pays particular attention to the intellectual capacities of human authors who stamp their work with a personal touch. Whether economic incentives should play a more important role also depends on legal alternatives for investors to protect the outcome of their investments. For example, unfair competition law (UCL) may provide a remedy if the generated outputs are replicated to gain an unfair competitive advantage by protecting the investments required to produce them.²²³

²¹⁶ *ibid*, 15.

²¹⁷ Albes (n 73) 83.

²¹⁸ *ibid*.

²¹⁹ Christie's (n 3).

²²⁰ Frye (n 193) 198.

²²¹ Scheurer (n 207) 842.

²²² C-604/10 *Football Dataco*, para 33; Kuscko/Handig (n 106) § 1 para 54.

²²³ *ibid*.

2. UNFAIR COMPETITION LAW AS AN ALTERNATIVE?

116. UCL may be the last resort for uncopyrightable AI-generated works and may make introducing new AI-compliant IP laws unnecessary.²²⁴ In contrast to the protection by copyright, which flows from the subject matter in question, the protection by UCL is focused on particular conduct.²²⁵ What constitutes unfair conduct depends on the respective jurisdiction.²²⁶ The following paragraphs will focus on Austrian unfair competition law which provides that:²²⁷

Anyone who in the course of business (1) resorts to an unfair commercial practice or another unfair practice which is likely to distort [...] the competition to the detriment of enterprises [...] may be sued for a cease-and-desist order and in case of fault for payment of damages.

117. Under Austrian law, the imitation of another's product is not considered unfair in itself. For an imitation to be unlawful, special circumstances must be present in the individual case from which the unfairness results.²²⁸ It is considered unfair conduct if a person imitates another person's unprotected - i.e., non-copyrighted - output without any substantial effort of his own, thereby competing with the other party who has expended substantial cost and effort to achieve the same result.²²⁹ With regard to other non-copyrightable subject matter, there is significant Austrian case law regarding, for example, the copying of an unoriginal book containing legislation which was held to infringe UCL because the copyist has unfairly saved himself the expenses and effort of typesetting and proofreading.²³⁰ However, for creations generated with WOMBO or DALL-E it appears inconceivable that a user could assert that another person is free-riding on exerted effort and costs of generating output (see introduction).
118. Furthermore, it may be considered unfair conduct if the imitator gives his own product the appearance or look of another's product and thereby evokes the risk of confusion.²³¹ Such an avoidable deception of origin requires a deliberate imitation, a risk of confusion and that a

²²⁴ Tim W. Dornis, 'Artificial Creativity: Emergent Works and the Void in Current Copyright Doctrine' (2020) 22 Yale J.L. & Tech 1, 27; Scheurer (n 207) 841.

²²⁵ Scheurer (n 207) 841.

²²⁶ Dornis (n 224) 26.

²²⁷ Austrian Federal Act Against Unfair Competition (Bundesgesetz gegen den unlauteren Wettbewerb 1984) BGBl. Nr. 448/1984 Section 1(1)(1).

²²⁸ Kuscko/Handig (n 106) Einleitung, para 424.

²²⁹ *ibid*, para 425.

²³⁰ *ibid.*, § 1 para 54; Austrian Supreme Court, OGH, 4.3.1980, 4 Ob 415/79.

²³¹ Kuscko/Handig (n 106) Einleitung, para 426.

different design would have been within reason.²³² However, the risk of confusion requires a form of competitive distinctiveness of the product which means that it has certain characteristics that enable distinction from similar products.²³³ Competitive distinctiveness of AI-generated works is not per se inconceivable.²³⁴ However, it is generally held to exist where a product has certain features and forms of design which distinguish it in the market from similar products of a different origin.²³⁵ While not entirely theoretical, it is difficult to imagine that this would serve as effective protection for works created with WOMBO or DALL-E that do not meet the originality threshold for copyright protection. Where such works are used as trademarks it is conceivable that trademark law could offer a form of protection, which would, however, not constitute an equivalent protection that copyrightable works enjoy.²³⁶

119. While UCL might provide a remedy, it also comes with caveats. First, because of its focus on unfair conduct, it is limited to a case-by-case analysis, which again affects legal certainty.²³⁷ Protection under unfair competition law does not serve the product itself but rather serves as a defense against unfair conduct of competitors.²³⁸ Secondly, unlike copyright, UCL protection has no term and could therefore theoretically be claimed for as long as necessary, potentially removing it from the public domain for longer than copyright.²³⁹ All in all, protection for AI-generated works under unfair competition law is possible but certainly not easy to achieve – especially with regard to works generated with WOMBO or DALL-E.
120. Arguably, this difficulty of protecting works that are not covered by the copyright regime is within the rationale of preventing excessive protection of subject matter that should be in the public domain.²⁴⁰ In my opinion, it would be excessive to grant protection to arguably artistic AI-generated works that do not meet the current or even a relaxed originality standard and are also excluded from UCL. Where substantial investment is involved in the creation of such works, UCL provides at least some protection against unfair imitation by third parties. Any other

²³² *ibid.*

²³³ *ibid.*

²³⁴ Sven Elter, 'Künstliche Intelligenz und kreative Erzeugnisse. Schutz von KI-geschaffenen Erzeugnissen' in Susanne Beck and others (eds.) *Digitalisierung, Automatisierung, KI und Recht* (Nomos, 2020) 181, 192.

²³⁵ Kuscko/Handig (n 106) Einleitung 426.

²³⁶ Elter (n 234) 189f.

²³⁷ Scheurer (n 207) 841.

²³⁸ Elter (n 234) 193.

²³⁹ Scheurer (n 207) 841f.

²⁴⁰ *ibid.*

protection would be equivalent to the protection of found objects, according to the presentation theory.

V. CONCLUSION

121. I have shown that humans currently still play a decisive role in creating AI-generated works. Further, I have demonstrated that attaining copyright protection for such works is not inconceivable but arguably very hard to achieve under current copyright law. I have outlined different possibilities for developers and users of creative AI systems to obtain authorship status. I have analysed the copyright implications for works generated with WOMBO and DALL-E and conclude that merely authorship of a user seems conceivable but still hard to establish. Arguably, the current copyright system makes works generated with DALL-E more likely to fall under copyright protection because this system allows its users to exercise more control over random elements than WOMBO. However, due to the difficulties in establishing copyright for AI-generated works, presumptions of authorship will be the most likely avenue to defend copyright claims in practice. Some non-copyrightable works may benefit from a protection under unfair competition law. However, this alternative also is not easy to establish because of the limitations stemming from the reliance on unfair conduct. Therefore, unfair competition law cannot be regarded as equivalent alternative to copyright protection.
122. The analysis has highlighted the pitfalls and crucial points for establishing copyright protection for AI-generated works. Based on these findings, I have suggested that a relaxation of the originality standard and the idea/expression dichotomy specifically for AI-generated works could lead to the copyrightability of AI-generated works that require original input from humans. This could be justified by accepting prompt-based AI-creations as new art forms which are inseparably linked to underlying original prompts. Such an approach could be a reasonable solution to the copyright dilemma, as it would allow the inclusion of AI-generated works without a complete reform of the long-standing principles and rationales of EU copyright law. Authorship would still require human originality and protect the expression of creativity that can go into the creation of AI-generated works. However, seemingly creative – because aesthetically pleasing – output created in a quasi-random manner would remain uncopyrightable.

BIBLIOGRAPHY

Legislation and official documents

Austrian Copyright Act (Urheberrechtsgesetz, UrhG) BGBl. Nr. 111/1936

Austrian Federal Act Against Unfair Competition (Bundesgesetz gegen den unlauteren Wettbewerb 1984) BGBl. Nr. 448/1984

Berne Convention for the Protection of Literary and Artistic Works, September 9, 1886, as revised at Stockholm on July 14, 1967, 828 U.N.T.S. 221.

Commission, 'Proposal for a Regulation of the European Parliament and of the Council laying down harmonised rules on artificial intelligence (Artificial Intelligence Act) and amending certain Union legislative acts' COM (2021) 206 final.

Copyright, Designs and Patents Act 1988

Council Directive 2009/24/EC of 23 April 2009 on the legal protection of computer programs [2009] OJ L111/16

Directive 2004/48/EC of the European Parliament and of the Council of 29 April 2004 on the enforcement of intellectual property rights OJ L195/16

Directive 96/9/EC of the European Parliament and of the Council of 11 March 1996 on the legal protection of databases OJ L77/20

Cases

Austrian Supreme Court, OGH, 4.3.1980, 4 Ob 415/79

Case C-145/10 *Eva Maria Painer v Standard VerlagsGmbH* [2011] ECR I – 12594

Case C-833/18 *SI, Brompton Bicycle Ltd v Chedech/Get2Get* [2020] ECR I-461

Joined Cases C-403/08 and C-429/08 *Football Association Premier League Ltd and Others v. QC Leisure and Others and Karen Murphy v. Media Protection Services Ltd* [2011] ECLI:EU:C:2011:631

Case C-393/09 *Bezpečnostní softwarová asociace – Svaz softwarové ochrany v Ministerstvo kultury* [2010] ECR I-13971

Case C-683/17 *Cofemel - Sociedade de Vestuário SA v. G-Star Raw CV* [2019] ECLI:EU:C:2019:721

Case C-469/17 *Funke Medien NRW GmbH v Bundesrepublik Deutschland* [2019] ECR I-623

Case C-05/08 *Infopaq International v. Danske Dagblades Forening* [2009] ECR I-6624

Books and contributions to books

Abbott R, *The Reasonable Robot Artificial Intelligence and the Law* (2020) CUP

Bayoumi R and others, 'Text-to-Image Synthesis: A Comparative Study' in Magdi D Aand others (eds) *Digital Transformation Technology. Lecture Notes in Networks and Systems* (Springer, 2022) 229

Bently L and others, *Intellectual Property Law* (5th edn, Oxford University Press 2018)

Cornish W, Llewelyn D, and Aplin T, *Intellectual Property: Patents, Copyright, Trade Marks And Allied Rights* (Sweet & Maxwell 2013)

Elter S, 'Künstliche Intelligenz und kreative Erzeugnisse. Schutz von KI-geschaffenen Erzeugnissen' in Susanne Beck and others (eds.) *Digitalisierung, Automatisierung, KI und Recht* (Nomos, 2020) 181

Grätz A, *Künstliche Intelligenz im Urheberrecht* (Springer 2021)

Kur A and Dreier T, *European intellectual property law: texts, cases and materials* (Edward Elgar 2013)

Latreille A, 'From idea to fixation: a view of protected works' in Estelle Derclaye (ed) *Research Handbook on the Future of EU Copyright* (2009) Edward Elgar 133

Margoni T, 'The Harmonisation of EU Copyright Law: The Originality Standard' in Perry M (ed) *Global Governance of Intellectual Property in the 21st Century* (Springer 2016) 101

Mueller J P and Massaron L, *Machine Learning for Dummies* (Hoboken: Wiley 2016)

Okpaluba J, 'Appropriation Art: Fair use or Foul?' in McClean D and Schubert K (eds), *Dear Images Art, Copyright and Culture* (Ridinghouse 2002) 197

Rosati E, *Originality in EU Copyright* (Edward Elgar 2013)

Stokes S, *Art and Copyright* (2nd edn, Hart Publishing 2012),

Walravens N, 'The Concept of Originality and Contemporary Art' in McClean D and Schubert K (eds), *Dear Images Art, Copyright and Culture* (Ridinghouse 2002) 171

Journal and newspaper articles

Albes A, 'Urheberrechtlicher Schutz von Produkten Künstlicher Intelligenz' (2020) *Berliner Rechtszeitschrift* 73, 75.

Barker E and Harding I, 'Copyright, the ideas/expression dichotomy and harmonization: digging deeper into SAS' (2012) *Journal of Intellectual Property Law & Practice* 673

Cheng G, 'The Aesthetics of Copyright Adjudication' (2012) *UCLA Entertainment Law Review*, 19(1) 113

Chused R, 'Temporary Conceptual Art: Property and Copyright, Hopes and Prayers' (2019) 45 *Rutgers Computer & Tech LJ* 1

Clark B, 'Freckles on her nose, diddle diddle dee': copyright protection of a literary figure' (2013) *Journal of Intellectual Property Law & Practice* 817

Croft J, 'Inability to patent AI creations could hit business investment' *Financial Times* (16 June 2022)

Deutscher Bundestag - Wissenschaftliche Dienste, 'Künstliche Intelligenz und Machine Learning, Eine urheberrechtliche Betrachtung' (2018) Ausarbeitung WD 10-3000-67/18

Dietrich J P, 'Augmented Reality-Umgebungen im Urheberrecht' (Dr.iur. thesis, Humboldt Universität zu Berlin 2020)

Dornis T W, 'Artificial Creativity: Emergent Works and the Void in Current Copyright Doctrine' (2020) 22 *Yale J.L. & Tech* 1

Drexl J and others, 'Technical Aspects of Artificial Intelligence: An Understanding from an Intellectual Property Law Perspective' (2019) Max Planck Institute for Innovation and Competition Research Paper No. 19-13

Economist, 'Could artificial intelligence become sentient?' *Economist* (14 June 2022)

Frye B L, 'Conceptual Copyright' (2021) 66 *South Dakota L Rev* 183

Ginsburg J C and Budiardjo L A, 'Authors and Machines' (2019) *Berkeley Tech L. R.* 343

Ginsburg J C, 'The Concept of Authorship in Comparative Copyright Law' (2003) 52 *DePaul L Rev* 1063

Gomille C, 'Kreative künstliche Intelligenz und das Urheberrecht' (2019) *JZ* 969

- Hetmank S and Lauber-Rönsberg A, 'Künstliche Intelligenz – Herausforderungen für das Immaterialgüterrecht' (2018) GRUR 574
- Hugenholtz P B and Quintais J P, 'Copyright and Artificial Creation: Does EU Copyright Law Protect AI-Assisted Output?' (4 October 2021) Springer 1190
- Inguanez D, 'A Refined Approach to Originality in EU Copyright Law in Light of the ECJ's Recent Copyright/Design Cumulation Case Law' (2020) IIC - International Review of Intellectual Property and Competition Law 797
- Kim D, 'AI-Generated Inventions': Time to Get the Record Straight?' (2020) GRUR International 443
- Lehr D and Ohm P, 'Playing with the Data: What Legal Scholars Should Learn about Machine Learning' (2017) 51 UCD L Rev 653
- Littoz-Monnet A, 'Copyright in the EU: *droit d'auteur* or right to copy?' (2006) 13:3 Journal of European Public Policy 438
- Löw N, 'Der Schutz ausübender Künstler bei musikalischen Darbietungen im deutschen und englischen Recht' (Dr.iur.thesis Justus-Liebig-Universität Gießen 2009)
- Luscombe R, 'Google engineer put on leave after saying AI chatbot has become sentient' *The Guardian* (12 June 2022) <<https://www.theguardian.com/technology/2022/jun/12/google-engineer-ai-bot-sentient-blake-lemoine>> accessed 20 June 2022
- Mongillo R, 'The idea-expression dichotomy in the US and EU' (2016) EIPR 733
- Müller-Chen M, 'Grundlagen und ausgewählte Fragen des Kunstrechts' (2010) Zeitschrift für Schweizerisches Recht
- Piora G, 'Copyright law and the promotion of scientific networks: some reflections on the rules on co-authorship in the EU' (2019) Queen Mary Journal of Intellectual Property 217
- Ramalho A, 'Will Robots rule the (artistic) world? A proposed model for the legal status of creations by artificial intelligence systems' (2017) Journal of Internet Law
- Sanftleben M and Buijtelaar L, 'Robot creativity: an incentive-based neighbouring rights approach' (2020) E.I.P.R. 797
- Scheurer S, 'Artificial Intelligence and Unfair Competition – Unveiling an Underestimated Building Block of the AI Regulation Landscape' (2021) GRUR International 834

Sganga C, 'The notion of "work" in EU copyright law after Levola Hengelo: one answer given, three question marks ahead' (2019) EIPR 415

Walter M, 'Grundriss des österreichischen Urheber-, Urhebervertrags- und Verwertungsgesellschaftenrechts' (2017)

Zankl W, 'Künstliche Intelligenz und Immaterialgüterrecht bei Computerkunst (2019) ecolex 244

Websites and Blogs

Bhattacharyya S, 'Diffusion Models Vs GANs: Which one to choose for Image Synthesis' (*AIM*, 7 February 2022) <<https://analyticsindiamag.com/diffusion-models-vs-gans-which-one-to-choose-for-image-synthesis/>> accessed 4 July 2022.

Brownlee J, 'A Gentle Introduction to Generative Adversarial Networks (GANs)' (*Machine Learning Mastery*, 17 June 2019) <<https://machinelearningmastery.com/what-are-generative-adversarial-networks-gans/>> accessed 4 July 2022.

-- 'What Does Stochastic Mean in Machine Learning?' (*Machine Learning Mastery*, 24 July 2020) <<https://machinelearningmastery.com/stochastic-in-machine-learning/>> accessed 5 July 2022

Christie's, 'Is artificial intelligence set to become art's next medium?' (12 December 2018) <<https://www.christies.com/features/a-collaboration-between-two-artists-one-human-one-a-machine-9332-1.aspx>> accessed 25 January 2022.

Cole D, 'The Chinese Room Argument' (*The Stanford Encyclopedia of Philosophy*, 2020) <<https://plato.stanford.edu/entries/chinese-room/>> accessed 3 July 2022.

Deepl terms and conditions Article 7.5 <<https://www.deepl.com/en/pro-license?tab=pro>> accessed 22 July 2022.

Dhariwal P and Nichol A, 'Diffusion Models Beat GANs on Image Synthesis' (arxiv, 2021) <<https://arxiv.org/abs/2105.05233v4>> accessed 4 July 2022.

European Commission, 'The EU copyright legislation' (*European Commission*, 23 February 2022) <<https://digital-strategy.ec.europa.eu/en/policies/copyright-legislation>> accessed 19 March 2022.

Grovier K, The urinal that changed how we think (*BBC Culture*, 11 April 2017) <<https://www.bbc.com/culture/article/20170410-the-urinal-that-changed-how-we-think>> accessed 30 June 2022

Hertzmann A, ‘Give this AI a few words of description and it produces a stunning image – but is it art?’ (*The Conversation*, 10 June 2022) <<https://theconversation.com/give-this-ai-a-few-words-of-description-and-it-produces-a-stunning-image-but-is-it-art-184363>> accessed 12 July 2022.

Horgan J, ‘How Do I Know I’m Not the Only Conscious Being in the Universe?’ (*Scientific American*, 11 September 2020) <<https://www.scientificamerican.com/article/how-do-i-know-i-m-not-the-only-conscious-being-in-the-universe/#:~:text=I%20prefer%20to%20call%20it,will%20vanish%20when%20you%20die.>>> accessed 3 July 2022

Hunt T, ‘How can you tell if another person, animal or thing is conscious? Try these 3 tests’ (*The Conversation*, 1 July 2019) <<https://theconversation.com/how-can-you-tell-if-another-person-animal-or-thing-is-conscious-try-these-3-tests-115835>> accessed 3 July 2022.

IBM Cloud Education, ‘What is Artificial intelligence?’ (*IBM Cloud Learn Hub*, 3 June 2020) <<https://www.ibm.com/cloud/learn/what-is-artificial-intelligence>> accessed 3 July 2022.

-- ‘What is strong AI?’ (*IBM Cloud Learn Hub*, 31 August 2020) <<https://www.ibm.com/cloud/learn/strong-ai>> accessed 3 July 2022.

Intellectual Property Office, Consultation outcome, Artificial intelligence call for views: copyright and related rights (Updated 23 March 2021) <<https://www.gov.uk/government/consultations/artificial-intelligence-and-intellectual-property-call-for-views/artificial-intelligence-call-for-views-copyright-and-related-rights>> accessed 29 June 2022.

johanezz, The Promptist Manifesto (*dl.ART*, 27 August 2021) <<https://deeplearn.art/the-promptist-manifesto/#>> accessed 25 July 2022.

OpenAI, ‘DALL·E 2’ <<https://openai.com/dall-e-2/>> accessed 18 July 2022

-- ‘DALL·E: Creating Images from Text’ <<https://openai.com/blog/dall-e/>> accessed 26 July 2022.

Rack F and Vetterman O, 'KI-Kunst und Urheberrecht – die Maschine als Schöpferin?' (Telemedicus, 13 February 2019) <<https://www.telemedicus.info/ki-kunst-und-urheberrecht-die-maschine-als-schoepferin/>> accessed 2 July 2022.

WOMBO, 'Dream created by WOMBO' <<https://www.wombo.art/>> accessed 22 March 2022.