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Works Generated by AI – How Artificial Intelligence Challenges Our Perceptions of Authorship

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Contents

Introduction

Gort[1], HAL 9000[2], R2-D2 and C-3PO[3], Skynet[4] – to every sci-fi enthusiast these are iconic names that are usually associated with literary or cinematographic mastery. In an academic environment, these names translate to some of the most prominent forms of artificial intelligence fiction has offered us in the past six decades. Impressive films and literary works, such as "2001: A Space Odyssey"[5], "I, Robot"[6], "Neuromancer"[7], "Hyperion"[8], Karel Capek's play "R.U.R." and so forth - they all fantasize in a fascinating and, to a certain extent, prophetical way about a future, where some form of artificial intelligence is an essential part of humanity's daily routine. It is fictional creations like these that have, in a broad sense, shaped our fears of and aspirations for omnipotent machine intelligence.

While seemingly greeted with initial skepticism and misbelief, fiction and cinema's prophecies were all, as it turns out, on the point. The presence of artificial intelligence in our lives today is undisputed and evermore tangible. Siri is talking with us when we're bored, Google's assistant is suggesting low-carb diets because two days ago it tracked us when we visited a dietitian's website, Facebook is suggesting what pages to like and follow based on our visits to certain locations or websites and SkyScanner is choosing the best possible flight, based on preferences we may not even be aware we have.[9] One may spend quite a long time digging out such examples and be completely overwhelmed by them, but what is worth mentioning is that the more illustrations we give, the more we realize to what an extent human lives are intertwined with machines and their capabilities.

It is evident that artificial intelligence is not a mere literary or cinematographic fantasy of sci-fi visionaries and conceptualists any more, but is increasingly becoming a tangible and, in many areas, even an essential part of our reality. Specifically, intelligent machines are moving away from being simple tools for facilitation of prosaic day-to-day routines and are expanding

[1] Intelligent robot in the film *"The Day the Earth Stood Still"*, 20th Century Fox Film Corp., USA, 1951;
[2] Intelligent computer in the film *"2001: A Space Odyssey"*, Stanley Kubrick, USA, 1968;
[3] Both intelligent robots in the film *"Star Wars: Episode IV – A New Hope"*, Lucasfilm Ltd., USA 1977;
[4] Intelligent computer in *"The Terminator"* franchise, first introduced in the *"The Terminator"*, Cinema 84 and Pacific Western Productions, USA, 1984
[5] Arthur C. Clarke, "2001: A Space Odyssey", 1968
[6] Isaac Asimov, "I, Robot", 1950;
[7] William Gibson, "Neuromancer", 1984;
[8] Dan Simmons, "Hyperion", 1989;
[9] Eli Pariser, *"The Filter Bubble"*, The Penguin Press,(USA, 2011);

into many more spheres of our life, determining and shaping whole economic and social branches[10] including inherently human strongholds like areas of creativity and inventiveness.

It is this paper's main goal to participate in the general debate on AI's effects on human life through examining the challenges it poses to Intellectual Property Law. As the following chapters will argue, some forms of artificial intelligence are so evolved and implemented into the creative process, that they can seemingly assume the part of the human being. By exploring what possibilities there are to attribute authorship when a copyrightable object is created by an algorithm, this paper seeks to address the consequences of the collision between longstanding legal and philosophical constructs in Intellectual Property Law on the one hand and rapid technological development in the subject matter of Artificial Intelligence on the other hand.

Therefore, it is essential for law to deal with the trend of AI creating copyrightable content. Attributing specific exclusive rights to the person who has created a product of IP, be it a patentable invention or a copyrightable work, is one of the cornerstones of the general IP framework worldwide. Legal authorship is an essential pre-condition in copyright law, as it is the philosophical justification for granting ownership rights; for providing third parties with licenses; for protecting and enforcing IP rights and so forth.[11] The traditional concept of authorship pre-supposes an evident and explainable link between the intellectual and creative process of the individual and the tangible expression of this process. Said in simpler terms – we are used to think that authorship is the direct genetic connection between creator and creation. It is this connection that AI interrupts by seamlessly evolving from a mere tool to a creative agent. It is in this paper's main focus to explore whether and how this incursion can be facilitated by contemporary legal systems.

Exploring the opinions of contemporary scholars, such as A. Birdy[12], P Samuelson[13], T. Sorjamaa[14], T. Margoni[15] and others, this paper will argue that traditional copyright institutes will experience difficulties when dealing with AI-generated copyrightable content. Unlike "computer-

[10] Matt Kiser, *"Machine Learning Trends and the Future of Artificial Intelligence"*, (Algorithmia, 2016)
[11] Annette Kur and Thomas Dreier, *"European Intellectual Property Law – Text, Cases and Materials"* (Edward Elgar Publishing Ltd., UK, 2013), Chapters 2 and 5; Christopher Buccafusco, *"A Theory of Copyright Authorship"* in Virginia Law Review (Vol. 102:1229, 2016), p.1275 and following;
[12] Annemarie Birdy, *"Coding Creativity: Copyright and the Artificially Intelligent Author"* in Stanford Technology Law Review, issue 5 (2012);
[13] Pamela Samuelson, "*Allocating Ownership Rights in Computer-Generated Works*", U. Pitt. L. Rev 1185 (1985);
[14] Tuomas Sorjamaa, "Authorship and Copyright in the Age of Artificial Intelligence", Hanken School of Economics, Helsinki (2016);
[15] Mark Perry and Thomas Margoni, "*From Music Tracks to Google Maps: Who Owns Computer-Generated Works?*" in Computer Law & Security Review, issue 26 (2010);

generated works", which were previously examined by doctrine and legislation[16], copyrightable works produced by some forms of artificial intelligence seem to successfully mimic human's creative process and output. Drawing on said mainstream argumentation, it is this thesis' goal to explore whether scholars' positions are still applicable to the contemporary and more complex reality of AI. Furthermore, this paper seeks to add to the academic debate by proposing a shift in perspective by arguing that a combined effect of open source rationale and the Public Domain may be a better fit for the creative output of AI. Instead of trying to adapt traditional legal constructs to an untraditional environment, it may be more effective to promote machine creativity by copyleft licenses and by assigning AI-generated works to the public domain.

The topic of AI's influence on authorship is usually greeted with either reserved skepticism or unrealistic excitement.[17] Dismissing the issue at hand as non-existent or too futuristic would be an oversimplification of the problematics, as well as an omission of the interests of various agents that are involved in the process of artificial intelligence's creative activities. Evidently, determining who is the author in cases, when an object of IP is created by an algorithm is a question that bears significant legal and economic implications. According to the doctrine's and legislation's perceptions of authorship, various stakeholders may have interest in being acknowledged as "authors in the eyes of the law": those who spent time developing the algorithm, or to those who have invested money in the process, or to those who have been "teaching" the self-learning program by providing input data, or, in some cases, even in the end-user[18]. All of these probable scenarios come with practical consequences that are already challenging intellectual property legislation, as they raise questions, that imply striking a fair balance between said private rights and the general public interest.

Despite initial expectations of slow progress, recent updates in the area of AI's creative capabilities reveal a variety of original works created by intelligent algorithms. For example, since 2010 - the year when the Emily-Howell project was initiated, an algorithm has been autonomously creating copyrightable classical music sonatas.[19] Some algorithms have been

[16] The term "computer-generated works" is used both throughout the doctrine as well as by the legislator in the UK and Ireland; Differentiation between this term and AI-generated works will be done in Chapter 2 herein.

[17] The skeptical attitude was experienced by the author when discussing the topic of this thesis with fellow students, who lack deeper experience and knowledge in IP subject-matter. For a more balanced approach see Birdy (n22); For more extreme approaches see Grimmelmann (n32) who questions the whole concept of authorship and Sorjamaa (n51), who implies that machine authorship may as well be an integral part of humanity's future.

[18] Jason Lohr, *"Artificial Intelligence Drives New Thinking on Patent Rights"*, (Hogan Lovells/Lime Green IP News, 15.07.2016);

[19] Tim Adams, *"David Cope: "You pushed the button and out came hundreds and thousands of sonatas"*, (The Guardian/The Observer, 10.07.2010);

known to create "journalistic content" and others have achieved what may be described as "artistic expression"[20] by using human-like informational structures[21]. Latest developments go even further and suggest that "creative writing" is also not reserved for humans anymore[22] and a proof of that is "Sunspring" – the first ever short film that uses a script written entirely by an algorithm[23]. Visual arts – a stronghold of human's imagination is also affected by interesting and engaging projects like Google's AutoDraw A.I. Experiment[24] or by the expected implementation of AI into open world videogames[25] and animation.[26], as will be explained more in details in the course of the thesis Finally, AI may also be capable of writing programs and viable lines of code.[27]

Developments like these clearly possess the potential to challenge core concepts of intellectual property law by asking a relatively simple question – who should be regarded as the author in the cases mentioned before – man or machine? Lurking underneath the surface of the seemingly easy answer is the implication that in terms of creativity AI is quickly catching up with humans, thus hinting a shift in law and society's perception of creativity and authorship. Following established logic of attribution of authorship one would look for the creative human being that has stamped the creative output with a hint of their personality.[28] But, judging by the rate of development of AI technologies, there may be cases where the "creative choices"[29] will not be done by a person, but rather by a machine.

Finally, in the light of the aforementioned, and for the sake of exhaustiveness, this paper will try to expand the horizon beyond the traditional conceptual paradigm and discuss attributing authorship to the algorithm itself. Adding this intriguing twist on the postmodern "death of the

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[20] Note, that establishing which forms of "artistic expression" constitute art and what is "art" in general falls outside the scope of the present work

[21] See the project "Then New Rembrandt" and other relevant project discussed in the following chapters; Also - Troy Kelly, *"Artificial Intelligence & Intellectual Property: Who Owns the Rights and Royalties?"*, (Artificial intelligence, 06.06.2016);

[22] John Frank Weaver, *"How Artificial Intelligence Might Monetize Fan Fiction"*, (ASU/Slate, 10.12.2013); Chloe Olewitz, *"A Japanese AI Program Just Wrote A Short Novel and It Almost Won a Literary Prize"*, (Digital Trends, 23.03.2016)

[23] Annalee Newitz, *"Movie Written by Algorithm Turns Out to be Hilarious and Intense"*, (ArsTechnica, 06.09.2016);

[24] AutoDraw is Google's way to train an algorithm to draw by introducing it to human input. More information on the dedicated website - https://aiexperiments.withgoogle.com/autodraw;

[25] Nick Hall, *"Eight Ways AI Makes Virtual and Augmented Reality Even More Real"*, (Topbots, 13.05.2017)

[26] Jennifer Wolfe, *"Hayao Miyazaki Not Impressed with AI-Programmed Animation",* (Animation World Network, 12.12.2016);

[27] Tom Simonite, *"AI Software learns to Make AI Software"*, (MIT Technology Review, 18.07.2017);

[28] *Bleistein v. Donaldson Lithographing Co.*, US Supreme Court, 188 US 239, (1903) Supreme Court of the US – a case where creativity and the personality of the maker were discussed as prerequisites for granting authorship and copyright protection.

[29] CJEU Case C-5/08 – *Infopaq International v. Danske Dagblades*;

author"[30] will acknowledge "machine's creativity" and in the same time will discuss whether a feasible solution to such a problem may be found within traditional tools of general copyright law.

In achieving the goals stated herein, this paper will analyze the contributions of aforementioned scholars as well as some relevant legal institutes and legislative approaches[31], thus employing a mixed methodology. The main research activity was based on desk-research of academic and journalistic content, as well as relevant case law and legislation. The analysis herein is limited to mainstream legal approaches typical for continental and common-law legal systems, thus assuming a more general legal perspective based on historical and theoretical underpinnings of said legal systems. In order to expose the differences between the two major legal systems, relevant case low from reputable courts in both systems will be quoted, reveling how the judiciary has been influenced by said systems' understandings. Further, due to the contemporary character of the issue, a carefully reviewed and evaluated selection of reputable online sources will be explored, which will provide a needed present-day context.

Finally, in terms of structure, the first chapter herein will follow the historical and cultural conceptualization and implications of "authorship". The term will be analyzed through its history as well as through legal standards of originality and creativity that are used to give its legal significance. The second chapter will introduce the current state of technology, exploring the advances that AI has achieved in copyright-relevant areas. Illustrating the computational powers of contemporary algorithms, the chapter will explain what AI is and provide a thesis-specific definition of relevant types of AI. Further, looking to tie together the argumentation of previous chapters, Chapter 3 will explore and analyze the different possibilities to assign authorship in the cases where AI has created a copyrightable object. By reviewing doctrinal opinions, this chapter will argue that AI challenges traditional IP constructs and will also introduce this paper's opinion on how to best facilitate the outputs of machine creativity. Finally, the conclusion will summarize this paper's findings, arguing that a more flexible approach rather than statutory copyright constructs' appropriation is a better suit to AI's push, as well as that AI will inevitably change the way we think of our creativity.

[30] Birdy (n.22), p.3;

[31] A comprehensive comparative legal analysis of the issue at hand will transcend the purposes and limitations of this paper.

Chapter One

Centuries of authorship

1.1. Introduction

Intellectual property right in general and copyrights in particular, are the result of developments in technology, politics, philosophy, and law. Breaking "authorship" into its core-elements and analyzing them reveals copyright as a versatile concept that has been shaped by cultural, philosophical, and legal factors over the course of centuries.[32]

By exploring the history of authorship and by looking into its "building blocks" this chapter aims to reveal authorship as a multi-layered term, whose significance goes beyond its mere legal connotations and reaches other social and scientific areas. More importantly this chapter seeks to provide a general analysis of how authorship is construed in continental law and in common law systems, thus hinting an answer whether machine authorship is feasible.

Getting familiar with the historical basis of copyrights and authorship is important for a better understanding of the issues copyright law is facing when dealing with challenging new technologies like artificial intelligence. Understanding the basic principles behind the layers of authorship, and what legal, philosophical, or cultural fundament they represent will allow for the appropriate allocation of authorship when dealing with contemporary issues. This historical perspective on when and how being an author gained legal significance will be provided in the first part of this chapter.

The second part of this chapter deals with how authorship is construed in the common law and continental law systems worldwide by focusing on creativity, originality, individuality, ownership, etc. – all terms with legal, social and philosophical connotations, that are important when contemplating the essence and the role of the author in the current global legal context. Exploring what the legal tradition in Europe and the USA requires in order to assign authorship

[32] Christopher May and Susan K. Sell, "*Intellectual property rights: A critical history*." Lynne Rienner Publishers, 2006

and how these requirements differ from each will set the stage for the analysis of authorship allocation possibilities further in this thesis.

Finally, regarding the main research question, this chapter will imply an answer to the question whether machine authorship is a feasible concept, while also evaluating the role of authorship in legal and more general social terms.

1.2. Copyright and authorship - a historical perspective

Copyright law and technological progress have so far developed together – the history of copyright is, in a sense, the history of technology[33]. Though not with absolutely the same meaning and scope as we use them today, copyrights can be dated back to ancient Rome where book traders used to dictate their manuscripts aloud so that slaves could copy them, thus producing multiple copies at a time[34]. After the fall of Rome and until the Middle Ages the concept of authorship and copyrights were of little importance as artistic expression and literary works were confined to a narrow and secularized audience. The concept of authorship at this time was not clear as it was customary for artistic work to be collectively created and to undergo the scrutiny of censorship, which suppressed individualism. It was the invention of the printing press in 1436 that enabled the massive literary expression and the large-scale proliferation of written works. Within fifty years of Gutenberg's invention the estimated number of all books circulating in Europe grew from thousands to millions[35].

Coupled with the ongoing technological development in the following century, the exponential growth of literary creation led to the emergence of bookselling and publishing as separate and growing industries[36]. The export of Venetian books throughout Europe in the sixteenth to seventeenth centuries raised the question of granting printing and distribution privileges as means of protecting books from unwanted and unauthorized copying. At this point of time copyright had assumed its most literal sense – it was a regulation that granted someone

[33] Sorjamaa (n51) 7;
[34] History of Copyright WebBlog, accessible under this link: http://www.historyofcopyright.org/index.html, last visited February 2017
[35] *Ibid*.;
[36] May and Sell (n9), and James Boyle and Jennifer Jenkins, "*Intellectual Property: Law and The Information Society, Cases and Materials";* Center for the Study of the Public Domain, Duke Law School (2014), Ch. 3;

the privilege of printing and copying someone else's book[37]. In England, the idea that copyright was bound to protect publishers and booksellers evolved into granting a monopoly over the importation of books[38]. In the second half of the seventeenth century, the monopoly grew into a practical suppression of literary works that were not approved by the Crown and its loyal affiliates such as the Stationers Company[39]. During this time of censorship and in later centuries the author (understood as "the writer" or "the painter") was still just one of many participants in a whole process of creating and proliferating a creative work[40]. Copyright's main focus was the work and its distribution.

A transition in copyright's purpose occurred in the XVIII century[41] in the United Kingdom with the publishing of the Statute of Queen Anne. From granting privileges and monopolies over literary works and abstract knowledge to the encouragement of writing of books that are useful to society whilst preventing unauthorized copying. The Statute reflected John Locke's ideas for individualization of intellectual property rights as a way of promoting creativity and access to free works and at the same time as an opposition to the ongoing Stationers' printing monopoly coupled with the Crown's censorship[42]. The Statute distinguished between the rights to the work itself and its reproduction, thus creating common law copyright as a by-product of trade regulation. Therein lies the novelty of this eighteenth-century document – although primarily a bill that protects booksellers' interests it, nevertheless, vested authors with the copyright as well, thus shifting the current focus of copyright. Not only was copyright "commodified"[43], but what is more important – the idea that the author may somehow be superior to the other craftsmen in the creative process has emerged[44]. The Statute of Anne "*marked the divorce of copyright from*

[37] May and Sell (n9) and Boyle and Jenkins (n11), Ch. 3;
[38] See English Parliament's 1624 Statute of Monopolies, according to which the Crown grants specific book traders and publishers the privilege to control the import and publishing of foreign literature as well as the copying and proliferation of local books.
[39] May and Sell (n9);
[40] Boyle and Jenkins (n11), Ch. 2;
[41] Some historians argue whether the year of publication of the Statute is correct – 1709 as well as whether the change in copyright's focus was really the product of the Statute of Anne or rather or the lawsuit between the Publishers of London and the Publishers of Scotland that followed the publication of the Statute. Resolving this issue is outside the scope of this paper. For the sake of completeness the impact of both events is mentioned.
[42] Benjamin Rand*, The Correspondence of John Locke and Edward Clarke,* 1927, p. 366,367; Boyle and Jenkins (n11), Ch. 2;
[43] May and Sell (n9);
[44] Peter Jaszi, "*On the Author Effect: Contemporary Copyright and Collective Creativity*" in The Construction of Authorship (Duke University Press, 1994);

censorship and the reestablishment of copyright under the rubric of property rather than regulation"[45].

An important change in legal and philosophical interpretations was enabled with the Statute and was made visible in the eighteenth-century feuds between English booksellers over the idea of copyrights. The two opposing main arguments – on the one hand the concept that copyright is derived from the author's natural right of ownership, regardless of the Statute of Anne's existence, and on the other hand the idea that copyright must be viewed as time-limited privilege, resembling the patent, intertwined, and fused together[46]. The globally important result of the argument was a shift in focus: from this moment on copyright protection focused not only on the work itself any more, but also on the author's ownership and creative power[47]. The idea of the "romantic author"[48] had emerged.

The "romantic author" concept is pivotal for contemporary legal and cultural understandings of authorship in the Western world. Whilst the previous stage of development in the concept was enabled and accompanied by technological and political development, the romantic author concept has sprung into being based primarily on aesthetic and ethical ideas. It was "vivid sensations" and a "spontaneous overflow of powerful feelings"[49] that determined human creativity in the realm of aesthetics philosophy in the beginning of the nineteenth century. Building further on this foundation and without prejudice to the proprietary aspect of authorship, the concept of a creator-genius emerged and established itself as the dominant understanding of that time. It stated that the author is the unique individual, a creative personality, "*who creates something original and is entitled to reap a profit*"[50] from his or her labour. An author plays, therefore, two different roles simultaneously – he or she is a creator, but also a holder of property that entitles to profit. Originality, Creativity and Personality have now become the distinguishing traits of an author and would determine the legal requirements for authorship for centuries to come.

[45] Mark Rose, "*Authors and Owners: The Invention of Copyright",* Harvard University Press (1993)
[46] Iibd.;
[47] Ibid.;
[48] The "romantic author" is an interdisciplinary term, best known in literary, cultural and philosophical sciences. It brings connotations that are important for said sciences and for their construction of the cited historical period. It is beyond the scope of this thesis to exhaustively explore such connotations. What this paper elaborates on are key characteristics of the term and how they became leading ideas when constructing the legal merits of authorship.
[49] Quotations are to be found in William Wordsworth's 1802 "*Lyrical Ballads";*
[50] Rose (n41), p. 12;

According to James Boyle,[51] romantic authorship ideas have transcended their aesthetic roots and have crept into the general legal discourse of copyright in three main ways. First of all, this idea puts the human, construed as an individuality and a unique genius in the centre of the legal and philosophical interest, which downplays the importance of external factors. Second, it influences the objectivity of the debate in copyright cases by creating and favouring the sympathetic figure of the author in general. And lastly, it mediates the core dichotomy of copyright law – "idea" vs. "expression". Furthermore, the variety of interpretations of the concept of the romantic author, both in philosophical and legal discourse, have solidified the two main doctrines that define contemporary national legal systems as well as the connection between author and creation. Both the Anglo-Saxon concept of *"copyright"*, which is more concerned with rights in the work, as well as the French doctrine of *"droit d'auteur"*, which distinguishes between transferable and untransferable rights, rely heavily on the terminology and semiotics apparatus of the romantic author concept[52]. As Keith Aoki summarizes, a spectre that is a "romantic vision of original authorship" has heavily influenced national copyright regimes in Western Europe and North America[53].

Finally, it should be noted that in more modern times the idea of "*the author as an individual creative personality, a solitary originator of stylistically consistent works*"[54] has been heavily criticized both in the literary and the philosophic realm. Foucault deems "author" a social construct that is historically and culturally specific[55]. The term needs to be construed in relation to external historical and cultural paradigms, which in turn renders the romantic author obsolete as inconsistent with modern times. On the literary scale, Roland Barhtes goes even further and proclaims the "death of the author"[56], while elaborating on the idea that a text is the intertextual product of other texts and authors and can only be understood through them, thus questioning the traditional meaning of concepts like individual authorship and originality.

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[51] James Boyle, *"Shamans, Software and Spleens – Law and the Construction of the Information Society",* Harvard University Press (1996), p. 114-117

[52] Rudolf Monta, "*The Concept of "Copyright" Versus The "Droit D'Auteur" Doctrine"*, 32 Southern California Law Review, 177 (1959)

[53] Keith Aoki, "*(Intellectual) Property and Sovereignty: Notes Towards a Cultural Geography of Authorship",* 48 Stanford Law Review, 1293 (1995);

[54] Birdy (n22), p. 5

[55] Michel Foucault, "*What is an Author"* Sofia University Press (1993)

[56] Roland Barthes, "*Image – Music – Text"*, Sofia University Press (1986)

1.3. Building blocks of authorship

While the cultural tradition tries to complement and re-define the concept of authorship, legal traditions have not denounced the conceptual structure of the nineteenth century's romantic author. Admittedly, not as pronounced as back then, the understanding that the author has to be creative and the work has to be original to qualify for protection still dominate copyright regimes. By exploring the two main ways authorship is derived – through originality and creativity, this part of the chapter takes a look at what copyright regimes worldwide require for someone to be attributed the title author.

Finally, it must be noted that a comprehensive comparative exploration on the merits of creativity and originality worldwide is well beyond the scope of this chapter, as merely seeks to show how the differences between two legal systems can result in important practical implications.

Before dealing with the specifics, it must be noted that on an international level Copyright has been harmonized with mixed success[57]. While many of the key concepts and constructs are similar across jurisdictions, there are issues that are left to the discretion of the national legislators, such as the required level of originality for example. The two main legal instruments on international level that seek to establish an equal minimal standard for copyrights in their member states – The Berne Convention of 1886[58] and the WIPO Copyright Treaty of 1996[59], focus on the subject matter to be protected by copyright and not on the degree of originality or creativity a work should exhibit[60]. The conventions do not even mention originality, but rather establish that copyright protects expressions and not ideas, thus leaving it to the national legislator to determine the grade of originality and creativity of the expression. This is the explanation as to why there is no unified standard to originality and why some countries (predominantly common law jurisdictions) have gone for the minimal standard possible, whereas

[57] Thomas Margoni and Mark Perry, *"Scientific and Critical Editions of Public Domain Works: An Example of European Copyright Law (Dis)harmonization"*, 27 Canadian Intellectual Property Review (2011);
[58] The Berne Convention for the Protection of Literary and Artistic Works of 1886
[59] WIPO Copyright Treaty (WCT), adopted in Geneva on December 20, 1996
[60] The text of art. 2 of the Berne Convention provides the reader with a non-exhaustive list of what is copyrightable subject matter. For brevity reasons, the full text of the article shall not be pasted here. The WIPO Copyright Treaty assumes the same approach – more information can be found under this link: http://www.wipo.int/wipolex/en/treaties/text.jsp?file_id=295157. Berne Convention available at this link: http://www.wipo.int/treaties/en/text.jsp?file_id=283698;

other countries (predominantly continental law jurisdictions) also require creativity to assign authorship.

1.3.1. Originality

Originality is the first milestone that one stumbles upon when dealing with criteria for authorship and copyrightability[61]. It is by far the most important and yet vague concept used to assign authorship by looking at the product. Put in the simplest terms possible – one would be regarded as author if they have created a work that is original in the sense that it was not copied from another work[62]. If the criteria for authorship were a sliding scale ranging from easy to hard, originality would be at the lower end of it[63], making it the easiest hurdle to clear. Essentially, it constitutes an intellectual tracking back – starting at the final result and tracing back to the beginning of the work, seeking to find whether there are similarities between this expression of an idea and someone else's[64].

Originality is a concept largely used in common law jurisdictions – The United kingdom Ireland, New Zealand, etc., where copyrights are awarded by examining the final product and whether it is original or not. The "text-book" example in this regard is the UK, whose only requirement of the work to be original[65] makes everything that is not copied is worthy of protection, thus turning its creator into an author. Assessed through the ideas of Lockean ethics and "sweat of the brow" doctrine that justify a reward for the maker based on their effort and labor, this is no surprise. Lowering the criterion to such an easily accessible level and coupling it with the reward of exclusive rights, seeks to fulfill copyright's main goal dating back to the Statue of Anne – to encourage the creation of new objects of artistic expression.

Continuing with the Locke's understandings that everyone has proprietary rights in the "fruits of their own labor", it must be noted that labor and effort are also part of the originality

[61] Georgi Sarakinov, "*Authorship Rights and Neighboring Rights in Bulgaria"*, Sibi Publishing, (Sofia, 2011);
[62] Jane C. Ginsburg, "*The Concept of Authorship in Comparative Copyright Law*" for DePaul L. Rev. Symposium: "The Many Faces of Authorship", Columbia Law School (2003)
[63] Thomas Margoni, "*The harmonisation of EU copyright law: The originality standard*" in Global Governance of Intellectual Property in the 21st Century, Springer International Publishing (2016);
[64] Sorjamaa (n51), 26;
[65] Article 1(1) letter (a) and article 3A (2) of the UK's Copyright, Design and Patents act of 1998. Article 1(1)(a) reading "*Copyright is a property right which subsists in accordance with this Part in the following descriptions of work— original literary, dramatic, musical or artistic works, […]*" and article 3A(2) of the same act reading: "*For the purposes of this Part a literary work consisting of a database is original if, and only if, by reason of the selection or arrangement of the contents of the database the database constitutes the author's own intellectual creation.*"

standard[66]. Under the "sweat of the brow" doctrine rewards of copyrights are afforded to the individuals who have shown "skill, judgment and labor"[67] in the execution of their original work. In the context of this paper, that is to say that in the common law system an author is this person who has shown skill and put effort in the creation of an original piece of work.

1.3.2. Creativity

On the other side of Margoni's scale[68] stands creativity – a standard higher than originality, as it requires from the work not only to "not be copied" but also to reflect its author in a way. That is not to say that originality and creativity are opposites that use different concepts to assign authorship, but rather that creativity is an advanced or extended version of the originality standard. Creativity is best understood when the object of protection is examined – while common law copyrights have originated and are to this day more focused on protecting against unauthorized copies of a work[69], continental copyright attends more to the author with their rights and obligations[70]. This is also explained by the influence of dignitarian philosophies and traditions over continental Europe's legal systems[71], where creativity is associated with the author's personality.

An accessible example for the creativity requirement in its simplest form is the case-law practice of the Supreme Court of the USA. Following a series of cases that struggled to define a common standard of eligibility of copyright protection, the highest court in the USA has, albeit somewhat controversially, established the requirement that copyrightable objects under US law have to "*possess more than a de minimis quantum of creativity*"[72]. What this "*spark of creativity*"[73] consists of, the court fails to interpret as it defines what creativity isn't rather than what it is. The Feist case also completes a departure of previous legislative tradition[74] where

[66] Monta (n47) p 9;
[67] *Ladbroke v William Hill* [1964] 1 All ER 465 – a recent case of the UK Supreme Court that confirmed and established the "sweat of the brow" standard and elaborated on its components;
[68] Margoni (n.49);
[69] Ginsburg (n.33), p. 16; Also, see previous parts of this chapter;
[70] Margoni (n.49);
[71] Larry Alexander and Michael Moore, "*Deontological Ethics*" in The Stanford Encyclopedia of Philosophy, Edward N. Zalta (ed.), (Winter 2016);
[72] *Feist Publications, Inc., v. Rural Telephone Service Co.*, 499 U.S. 340, (1991), Supreme Court of the United States;
[73] Ibid.;
[74] Birdy (n.51);

authorship was a signifier of origin[75] and later interpretations where authorship was associated with the personality of the maker[76], thus reducing contemporary legislative requirements to the vaguely defined "spark of creativity".

Relying on dignatarian underpinnings[77], some continental legislative systems choose to couple the creativity requirement with the personality of the author. For example, in France and Belgium, courts consider originality as the imprint of the authors' personality over their work[78]. In Austria, looking back at the precise wording of the Austrian Copyright Act[79] the lawmakers have used the word "eigentümlich" which apart from the notion of originality carries a proprietary nuance, thus pointing to the personality of the author as well. German legislature also requires creations to be individual and personal.[80]

On a more global European level, the European Union has tried to implement a unified originality standard through the enactment of sector-specific legislation. Yet these attempts have had limited success as they seek to harmonize the internal market when dealing with copyright issues rather than copyright as a whole legal system[81]. It was only after the CJEU's consistent attempts through case-law interpretations that a common horizontal standard of has been achieved. In five landmark rulings[82] the Court has established the originality standard to be the "author's own intellectual creation", meaning that a copyrightable work under EU law has to be the product of its author's free and creative choices and has to bear personal stamp of their creator[83]. This is the standard that national legislators have to abide by when dealing with copyright issues in the context of EU legislations. In practical terms, the combined effect of these

[75] *Burrow-Giles Lithographic Co. vs Sarony*, 111 U.S. 53 (3-17-1884), Supreme Court of the United States – in this case the judges of the court deliberated on originality as a signifier for origin, meaning that authorship signifies that the person is the originator of the work;

[76] *Bleistein v. Donaldson Lithographing Company*, 188 U.S. 239 (1903), Supreme Court of the United States; In the text of the case we read: "*The copy is the personal reaction of an individual upon nature. Personality always contains something unique … something irreducible, which is one man's alone. That something he may copyright.*"

[77] Alexander and Moore (n.12);

[78] Kur and Dreier (n.7);

[79] Article 1 of the Austrian Federal Law on Copyright in Works of Literature and Art and on Related Rights (Copyright Act), original text of the article: "*Werke im Sinne dieses Gesetzes sind eigentümliche geistige Schöpfungen auf den Gebieten der Literatur, der Tonkunst, der bildenden Künste und der Filmkunst*."

[80] Margoni (n.49), p.19;

[81] Ibid.;

[82] *Infopaq International v. Danske Dagblades Forening* – case C-5/08, Court of Justice of the EU; *Bezpečnostní softwarová asociace v. Ministerstvo kultury* - case C-393/09, Court of Justice of the EU; *Football Association Premier League v. QC Leisure and Karen Murphy v. Media Protection Services* – joined cases C-403/08 and C-429/08, Court of Justice of the EU; *Eva-Maria Painer v. Standard VerlagsGmbH* – case C-145/10, Court of Justice of the EU; *Football Dataco v. Yahoo!* – Case C-604/10, Court of Justice of the EU;

[83] Ibid.;

five cases allows for the conclusion that on EU level a work lack originality when it is not the product of free and creative choices and when it doesn't somehow represent its author. What's more, in the light of these decisions, skill, labor and effort put in an expression of an idea are not necessarily indicators for creative choices or the author's individuality.

1.4. Concluding remarks

Over the centuries of its existence Copyright Laws have been moulded by political, technological and ethical developments and authorship has evolved together with it. What this chapter showed is that authorship is a concept whose connotations transcend its legal margins. What may be socially acknowledged as authorship may be irrelevant in the eyes of copyright legislation since it does not meet the criteria for protection. Conversely, what postmodernistic traditions may deem obsolete concept may still be used by national and supranational legislators. Finally, looking at a deeper perspective, authorship is, in a sense, a crucial part of what makes us human – as courts and philosophers have duly noted over the years, creativity and thus authorship is intrinsic only to humans.[84]

While for the functioning of copyrights in general this may not be of importance, the difference in the originality standards is of significant interest to this thesis, as it reveals the criteria for authorship together with their flexibility. In the context of machine authorship, the stringency of the originality criteria determines whether a machine can be deemed author in legal terms, as will be analyzed in the following chapter.

[84] Boyle and Jenkins (n.11), ch. 2;

Chapter Two

Decades of AI

2.1. Introduction

The rapid technological development of the past couple of decades and the evolution of computer intelligence are closely related[85]. They are part of the same dynamic that promises benefits on many levels but also brings many challenges to established socio-economic structures[86]. In the area of creativity and creative expression, there is a departure from the established perception of machines as mere tools of creation that is already in motion and at the center of this are the newly discovered capabilities of large scale computing. Understanding AI and the environment in which it thrives is important for this thesis as it provides a needed context in which the interaction between AI and copyright law takes place.

The general purpose of this chapter is to introduce the concept of artificial intelligence and explore its disruptive potential – both generally and specifically in terms of creativity and authorship. Looking at the definitions and the variety of applications of "intelligent machines" this chapter will try to reveal the multifaceted character of AI, thus implying its capabilities to challenge traditional societal constructs. Ultimately, this chapter seeks to explore how the all-encompassing character of AI together with the rapid technological developments are responsible for the disruptive potential of the emerging technology.

The first part herein aims at achieving better understanding of AI by dealing with the issues of defining and categorizing it. Without claiming exhaustiveness, the first sub-chapter lays down some definitions of AI and discusses their shortcomings and the legal importance of a definition. The second chapter focuses on whether there are any distinctive features that easily define "creative" AI in comparison to other types. The second part of this chapter explores the

[85] The easiest example in that regard is the evolution of the telecommunications industry and smartphones.
[86] Joseph Coughlin, *"The Promise of Technology. Getting Technologies Out of the Laboratory"* in Summary of Workshop: "Fostering Independence, Participation, and Healthy Aging Through Technology", Washington (DC), National Academies Press (US, 2013).

current developments in the subject matter of creative AI thus implying that computational creativity has caught up with humans.

2.2. Definition of AI

Defining "Artificial Intelligence" is an important, yet a hard task, as the concept of artificial intelligence may be given various interpretations from different scientific points of view, which in turn leads to the lack of a unitary and concise definition. The complexity of the matter stems from the fact that "Artificial Intelligence" is more of an "umbrella term" that comprises areas of computer sciences, arts, and philosophy, that all have different goals and applications for AI. As usual in situations like these definitions vary in their scope and exhaustiveness in relation to the purpose they serve[87]. Taking these specifics into account, this part of the chapter will try to focus on a general definition of AI, discuss the need of such a definition and then extract the characteristics of AI that serve the purposes of this paper.

The Oxford Dictionary provides the curious with a broad interpretation, according to which artificial intelligence is the "*theory and development of computer systems able to perform tasks normally requiring human intelligence*".[88] Searching the vast and academically questionable tech-related websites will provide the researcher with a variety of incoherent and case-specific attempts at defining today's ubiquitous incarnations of artificial intelligence.

Yet, the common trait to all these definitions is that they all point to AI as being a branch of computer sciences that relates to machines performing tasks usually done by humans. A consultation with scholars in the field of computer-sciences[89] will give us a similar outcome. Shterionov defines AI as a "*broad scientific field which aims at the study and the development of computer systems that can simulate human behavior*."[90] While such broad definitions enjoy the mass approval of scientists of various backgrounds, they seem to be overly inclusive or exclusive, thus omitting characteristics of interest to different scientific areas. For instance, further in his

[87] Julia Black, "*Critical Reflections on Regulation*", 27 Australian Journal of Legal Philosophy, (2002)
[88] Online Oxford Dictionary, accessible at https://en.oxforddictionaries.com/, search inquiry input "artificial intelligence".
[89] Dimitar Shterionov, "*Design and Development of Probabilistic Inference Pipelines*", KU Leuven, Faculty of Engineering, (August 2015); Similarly - Pei Wang, "*What Do You Mean by AI?*" in Proceedings of the 2008 conference on Artificial General Intelligence, (Amsterdam, 2008)
[90] Shterionov (n.28) p.3;

dissertation Shterionov offers a highly specific definition of AI that pertains to the fields of probabilistic logic programming and statistical relational learning, thus rendering it unsuitable for a widespread use[91].

A more expanded definition of the term was given at the dawn of intelligent computing when the term "Artificial Intelligence" was created by computer scientist J. McCarthy. In his work, McCarthy not only defined AI as "*the science and engineering of making intelligent machines, especially intelligent computer programs*"[92] but went further by interpreting the connotations of intelligence. Similarly, in more modern times Nilsson also offers a definition that focuses on an interpretation of intelligence. According to him artificial intelligence is "*that activity devoted to making machines intelligent, and intelligence is that quality that enables an entity to function appropriately and with foresight in its environment*"[93]. Consequently, what these two definitions show are the two main denominators of AI, based on intelligence[94]: while McCarthy's understanding presupposes a focused and efficient computer, created for the performance of more specific tasks, Nilsson's definition implies a more omnipotent notion. It includes the expressed functionality in McCarthy's effort and, by focusing on "*foresight in its environment*"[95], Nilsson hints that an intelligent machine will be one that possesses awareness of itself and its surroundings.

This is where and how the notions of "weak" and "strong" AI are born. Without the ambition for an exhaustive overview of these notions, said differentiation explores the general purposes for the existence of artificial intelligence based on a notion of intelligence as well as on an approximation to human capabilities[96]. According to this idea, AI should be "strong" "as a human-like figure[97], whereas "weak" AI is to be understood as a system built specifically for one purpose or one usage, i.e. chatbots or, in the context of this thesis – AI that creates music.

When interpreting AI based on its omnipotent abilities and awareness, the efforts of M. Cummings and A. Hutchins are worth mentioning. Together with other scholars, these two contemporary computer scientists have created a three-stage model that expresses the way an

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[91] Ibid.p. 9;
[92] John McCarthy, "*What is Artificial Intelligence?*", Stanford University, (November 12, 2007);
[93] Nilsson (n.43);
[94] It is outside the scope of this paper to analyze and understand what human and machine intelligence are. The term "intelligence" is therefore used in the broader sense, without prejudice to possible qualitative and quantitative connotations.
[95] Nilsson (n.43);
[96] Stuart Russel and Peter Norvig, "*Artificial Intelligence: A Modern Approach*", Prentice Hall Publishers, (USA, 2009)
[97] Alice Huang, "*Computer Intelligence and the Touring Test*", University of Berkley, Engineering faculty, (2005);

autonomous machine should approach and perform a given task[98]. According to the "Sensing-Optimization/Verification-Action" model, when approaching an issue, a machine would first use its sensors to perceive its surroundings and gain circumstantial awareness and only after that it should determine case-appropriate actions and execute them.

A more comprehensive approach to defining artificial intelligence is proposed by Peter Norvig and Stuart Russel in their prominent textbook on Artificial Intelligence[99]. In their work, the authors quote other scholars' definitions of AI, dividing them based on how said scholars approach the technology at hand. So, for example, when regarding AI as "thought processing and reasoning", Bellman defines it as "*activities that we associate with human thinking, activities such as decision-making, problem-solving, learning*"[100]. Further in the course, another set of definitions focus on the notion of behavior, stating that artificial intelligence is about making computers act in human-like ways and in areas that people are currently superior[101]. In the textbook, there are also definitions that employ a comparison between computer and human intelligence. Finally, the authors present their own take on what "artificial intelligence" is by defining it through the emerging contemporary concept of machine learning: "*Machine learning refers to a subfield of computer science concerned with computer programs that are able to learn from experience and thus improve their performance over time.*"[102] Drawing our attention to the learning capabilities of intelligent computers, Norvig and Russel managed to catch one the most esteemed trends in contemporary developments and understandings of AI. Teaching computer programs to learn from experience and interact with their own components in a way that resembles the interactions in the human brain is currently deemed one of the most advanced and fruitful evolutional steps in AI's life[103].

Another approaching to defining AI based on its functionality is presented by Stanford's scholar Kahana, who distinguishes four types of AI-based applications depending on the grade of sophistication of the intelligent system[104]. In his article, he identifies applications by assessing

[98] Andrew R. Hutchins et al., "*Representing Autonomous Systems' Self-Confidence Through Competency Boundaries*" in "Proceedings of the Human Factors and Ergonomics Society Annual Meeting", (2015)
[99] Russel and Norvig (n.14);
[100] Ibid.;
[101] Ibid.;
[102] Ibid.;
[103] Jeff Dean, Google Senior Fellow in the Systems and Infrastructure Group, "How Will Artificial Intelligence Affect Your Life", December 2016 at a TEDx even in LA, California, video available online.
[104] Eran Kahana, *"Intellectual Property Infringement by Artificial Intelligence Applications"*, Stanford Center for Legal Informatics, (2016);

their ability to perform specific tasks and ability or inability to exhibit any operational variance[105]. The scientist puts at the lowest end programs that are created to perform only specific functions and deviations from the initial purpose and programming are impossible (level A and B), while on the "top-shelf" he puts such types of artificial intelligence that have autonomous decision-making capabilities and exhibit abilities to perform self-reprogramming and behavioral control (level C and D).

Finally, for the sake of exhaustiveness, there are some definitions outside the field of computer sciences, that are worth mentioning, as they reveal how multilayered is the concept of AI. For instance, J. Zittrain – professor at Harvard Law School, dismisses the formalistic scientific approach and refrains from using technical terms when labeling AI as "*just forms of systems that evolve under their own rules in ways that might be unexpected even to the creator of those systems, that will be used in some way to substitute for human agency*"[106]. This broad definition opens the door for more contemporary techniques of creating intelligent computers, such as the aforementioned "machine learning". Or even for other, more complex techniques like "reinforcement learning" and "neural networks"[107], which, according to A. Patel, can be defined as follows: "…*neural networks allow agents to learn only during their lifetimes. Reinforcement learning allows agents to learn during their lifetimes and share knowledge with other agents."*[108]

Evidently, giving a definition to a ubiquitous term as "artificial intelligence" is a complex task that entails a multitude of practical and conceptual implications. As M. Boden – a prominent cognitive scientist, suggests that the complexity of AI can put to use as, it may provide us with an idea of the "*principles of intelligence in general and human thought in particular*"[109]. This seemingly unpretentious statement, in this paper's opinion, entails what all aforementioned definitions imply or explicitly state – Artificial Intelligence is a way in understanding and achieving human intelligence untangled from them burdens of its biological shortcomings.[110]

In conclusion, "artificial intelligence" is a multifaceted umbrella term. Defined through its various characteristics or through its implicitly inherent strive to resemble human intellectual

[105] Ibid.;
[106] Jonathan Zittrain, "*Openness and Oversight of Artificial Intelligence*", Berkman Klein Center for Internet and Society at Harvard University, (2017), available at this link: https://cyber.harvard.edu/node/99783
[107] Amit Patel – "*AI Techniques*", Theory.stanford.edu, 2017, available under the following link: http://theory.stanford.edu/~amitp/GameProgramming/AITechniques.html
[108] Ibid.;
[109] Margaret Boden, "*Creativity and Unpredictability*" in "Constructions of the Mind", SEHR, vol. 4, issue 2 (1995);
[110] Mathew Scherer, "*Regulating Artificial Intelligence Systems: Risks, Challenges, Competencies, and Strategies*" in 2 Harvard Journal of Law & Technology, Vol. 29, (Spring 2016);

capacities, computer intelligence assumes a variety of forms that all serve a specific purpose and bring their own shortcomings.

As there is no unified approach to interpreting AI – neither in general, nor specifically in the creative context, it is well beyond the purpose of this chapter to try and propose a stand-alone definition of "artificial intelligence" or to dwell deeper in the problematics of existing definitions. For the purposes of this thesis "artificial intelligence" shall be understood in a practical sense and in relation to a relevant copyrightable output. Put in simpler terms – in this thesis "artificial intelligence" shall be understood as any complex software and/or algorithmic system that utilizes some advanced techniques of computational intelligence, such as "machine learning", "reinforced learning" or similar and that can produce a copyrightable output, regardless if the result was the system's goal or a by-product. The advanced learning technique part of this definition is especially important to this thesis, as in such cases human participation in the creative process is reduced to a questionable substance, as examples below will argue. Finally, for the sake of completeness, it is important to note that these characteristics of AI are what distinguishes it from previously used terms such as "computer-generated works"[111] and "procedurally created works"[112].

2.3. Development of AI – where are we now?

As a theoretical concept and artistic fascination AI has been known for quite some time. Until recently feasible practical implications of AI were still in their infancy and an all-encompassing example of an intelligent machine was deemed a topic for the distant future[113]. This part of the chapter introduces some examples that will demonstrate how surprisingly dynamic and fruitful the development of AI in recent years have been. Further, and more importantly, said examples will illustrate how intelligent algorithms have advanced to a point where they can seemingly autonomously create copyrightable objects.

For years a self-aware omnipotent computer was present in the realms of literature and cinema and the examples of such incarnations of AI were mentioned in the beginning. Society's

[111] Term is used by Samuelson (n.44), by Glasser (n.28) and by Perry and Margoni (n.40), who even explicitly acknowledge that works created by computers and by AI are different due to the characteristics of the latter. "Computer-generated works" is defined in section 178 of the UK's Copyrights, Designs and Patents Act as works "*[…] generated in circumstances when there is no human author of the work.*";
[112] Birdy (n.22), p. 2-4; Term is used in the same sense as "computer-generated works";
[113] Lea (n.79);

skeptic perception of whether an intelligent machine can exist was shaken in 2011 when Watson – IBM's intelligent computer, won at Jeopardy playing against two of the game's greatest players[114]. Going back to the Turing Test's association with machine intelligence, the ambition to pass the Turing Test is what back in the 2000's initiated the creation of IBM's supercomputer[115]. While not a victory of socially overwhelming proportions, Watson's success in the popular TV quiz is a great illustration of how quick the subject matter evolves. What makes IBM's latest supercomputer so advanced, in comparison to its predecessor for example[116], is its ability to deduce information from ambiguous clues[117], thus implying some initial success at mimicking human intelligence.

What really proved to the world that a generally intelligent machine is not any more a subject for the distant future was the 2015 win of DeepMind's AlphaGO against the reigning 3-times European Champion of Go[118]. Created in China more than 3000 years ago, GO is considered as game of immense complexity: "*There are an astonishing 10 to the power of 170 possible board configurations - more than the number of atoms in the known universe*"[119]. What makes the game extremely hard of AI to master is the fact that, despite its simple and strict rules, GO is played primarily with feel and intuition. In the words of Demis Hassabis – the CEO of DeepMind and co-creator of the algorithm behind it, taking on a challenge of such proportions was the best way to illustrate DeepMind's attempt to understand and solve intelligence[120].

Evidently, in just the first 15 years of the new millennium, scientific progress has matured enough to take on tasks previously deemed impossible. This is also true for creative expression and the creative industry – an area of life dominated by humans for centuries is today in a state where machines are becoming more of creative agents, rather than just simple tools[121]. The

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[114] Adam Gabbatt, "*IBM computer Watson wins Jeopardy clash*" (The Guardian, February 2011), accessible at this link: https://www.theguardian.com/technology/2011/feb/17/ibm-computer-watson-wins-jeopardy

[115] Gary Kasparov and Mig Greengard, "*Deep Thinking: Where Machine Intelligence Ends and Human Creativity Beginns*", Public Affairs Publishing (2017); p. 8-15;

[116] In 1997 another of IBM's supercomputers won multiple chess games against Gari Kasparov - the world chess champion at the time.

[117] Gabbatt (n.72);

[118] More information on the AlphaGo project of DeepMind, can be found on the company's website at https://deepmind.com/

[119] Quotation from the website of the AlphaGo project of DeepMind, accessible at https://deepmind.com/research/alphago/

[120] Demis Hassabis - computer scientist and CEO of Google's DeepMind, at public lecture of "The Royal Television Society", November 2015; Report of the event available at this link: https://www.rts.org.uk/article/deepminds-demis-hassabis-future-intelligent-machines

[121] Birdy (n.22);

introduction to this thesis mentions such examples in an effort to illustrate that AI is applicable in variety of areas that create copyrightable objects. Ranging from simple musical compositions such as the outputs of Emily-Howell project, where an algorithm creates music sonatas[122], through writing programs and viable lines of code[123], to even being involved in artistic visual expressions[124] and creative writing[125].

Yet, after taking a detailed look in those examples, it is easy to see that some of them are mere reincarnations of similar forms of AI, whose application is non-controversial. For example, the algorithm behind the Emily Howel Project is deemed to have finite possibilities for creating musical compositions since it utilizes a pre-set of options, thus limiting its originality and output possibilities.

What interests this thesis and illustrates its main goal, are creative endeavors like the ones initiated by Google with their AI Experiments initiative. Not even a year ago[126], employing the capabilities of DeepMind Lab and TensorFlow[127], Google launched a platform that allowed its users to "experiment" with different forms of AI[128], i.e. to teach an algorithm to draw, to create sounds with the help of an algorithm or even to teach it to recognize sounds and images. This experiment allows the user of the website to help build deep neural networks and thus increase the capabilities of the algorithms. Today, the "drawing" algorithm of Google has advanced in such a way that it can recognize a desired shape just after the first couple of strokes. After successfully recognizing what the user meant with their scribbles, the algorithm proposes to replace the inaccurate shapes with a perfect rendition of what the user sought to express. In the relation to the central question of this thesis, such a possibility undoubtedly raises the question – who was the author of the perfectly rendered shape in the aforementioned case – was it the user with their legally irrelevant "intent to create"[129], or was it the algorithm that is seemingly the de facto maker? Questions like these what the next chapter would seek to answer.

In the aforementioned example, the role of the human is yet visible and therefore undisputed. Computational creativity has advanced further though, almost eliminating human

[122] Adams (n.89);
[123] Simonite (n.91);
[124] Wolfe (n.82);
[125] Weaver (n.83), Olewitz (n.77) and Newitz (n.74);
[126] Bell (n.86)
[127] More information on TensorFlow and their machine learning algorithms available at their website: https://www.tensorflow.org/
[128] More information on the dedicated website - https://aiexperiments.withgoogle.com;
[129] See previous chapter;

participation in the creative process. An example for such an application of AI this paper sees in WaveNet – an AI, that relies on neural networks to generate sounds like speech and music[130]. In the case of this deep neural network, after the initial input of desired requirements for the output, the human has no control and understanding of how the artificial intelligence creates the sounds it produces[131].

Scientific advances have even gone further and combined two neural networks to work together – they compete against each other, thus ultimately training and improving each other without human intervention. This is what the scientific tam behind the StackGAN algorithm have done[132] - by putting algorithms in adversarial conditions they have successfully synthesized photo-realistic images of birds and flowers. During the process of creation – a constant checking, examination and approval between the algorithms, a human cannot intervene, thus leaving the creativity solely to the algorithm. Seemingly, the outputs of this AI are original in the sense of "*not copied by someone else*"[133], and thus may be eligible for copyright protection, were they created by a human being.

Last but not least, the example that instantly overcomes initial skepticism regarding creative capabilities of AI is "The Next Rembrandt" project[134]. Involving serious computational efforts and creative algorithmic calculation, provided by Microsoft, significant financial aid, provided by the JWT Banking group and finally 3D printing technology at the premises of TU Delft[135], this immense project set itself the ambitious task to bring the great Dutch master back to life by employing computational creativity. While some may deem the project to be merely data visualization thus not important for the world of computer sciences, to copyright and machine creativity it is crucial. First, it straightforward eliminates the widespread skepticism that machines can paint, by creating a visually stunning piece of art. Second, in terms of attributing

[130] Aaron van den Oord et al., „*WaveNet: A Generative Model for Raw Audio*", (Google, London, UK; 2016), available at this link https://pdfs.semanticscholar.org/df04/02517a7338ae28bc54acaac400de6b456a46.pdf

[131] Ibid.; Examples of the specified and unspecified output of the WaveNet algorithm can be found at this link: https://deepmind.com/blog/wavenet-generative-model-raw-audio/

[132] Han Zhang et al., "*StackGAN: Text to Photo-realistic Image Synthesis with Stacked Generative Adversarial Networks*", Department of Computer Science, Rutgers University, (December 2016);

[133] See previous chapter;

[134] More information including the stunning visual piece that was the final creation of the project can be found under this link: https://www.nextrembrandt.com/;

[135] Tim Nudd, "*Inside 'The Next Rembrandt': How JWT Got a Computer to Paint Like the Old Master*", (Adweek, June 2016), available at this link: http://www.adweek.com/brand-marketing/inside-next-rembrandt-how-jwt-got-computer-paint-old-master-172257/; More detailed information on the project can be found here https://www.jwt.com/en/work/thenextrembrandt

authorship, it reveals the complexity of the issue of pinpointing the exact creator of the output in such cases.

2.4. Concluding remarks

Recent technological developments have made it possible AI theory to become practice. In the past couple of decades, the world saw intelligent machines reaching unexpected heights by employing human-like intuition, analysis, and learning techniques. In less half a century, artificial intelligence has evolved so much that today society is witnessing a time, where algorithms gradually invade one of humanity's strongholds – creativity. What was once considered an inexplicable manifestation of divine-like creative genious of a single person, can today be considered dissolvable into algorithmic logic. Put in simpler terms, the examples in this chapter have sought to prove that in terms of creativity and creative output machines have caught up with humans.

Chapter Three

Who is the author?

3.1. Introduction

Despite its seeming obviousness, the answer to the question of who is the author is not as simple as it may look, as it revolves around important theoretical and practical implications, such as justification of awarding exclusive rights, striking a fair balance between a variety of economic interests, etc. Matters of authorship relate to the core rationale of copyright systems in general, as determining the author is the basis for granting statutory proprietary rights, it affects investments in copyrights and developments, promotes creation and creativity on many levels and is essential to the existence of a copyright system.

The goal of this chapter is to map legal challenges of attributing authorship in the cases when a copyrightable object was generated by a form of AI. In said cases authorship could validly be claimed by different stakeholders involved in the creative process or could be attributed based on some unconventional contemporary possibilities for addressing the problem.

Each part of this chapter explores a possible solution to the issue at hand and presents a deliberation on the arguments that support and/or diminish said stance's feasibility. Following what has been doctrinally and legislatively established[136], the first part of this chapter will focus on the programmer and the user as the most feasible bearers of copyright interests in AI's creation. The second part will discuss more modern approaches toward the issue by exploring the possibilities for attributing rights to the algorithm itself or for creating a joint authorship between human and algorithm. Lastly, inspired by the idea to assign the work to the Public Domain, the third part of this chapter will introduce the author's position on the issue at hand.

[136] Samuelson (n.44) and Perry and Margoni (n.40) are examples from the academic realm; For the legislative approach see Article 21(f) of the Irish Copyright Act (n.54) as well as Article 9(3) of the UK's Copyright Act (n.55). For the text of the articles – note 139 herein.

3.2. The human author and owner

Attributing rights to one of the humans involved in the process of computational creation – the programmer or the user of an AI – is the most expected and the least controversial solution. This is a resolution that is consistent with the idea for the solely human origin of creativity[137]. It reflects and is consistent with traditional conceptions of authorship such as the "romantic author" concept apparatus and Lockean ideas for the rights in the fruits of one's labour[138].

Assigning authorship to the person who is closest to the creative process is an idea also acknowledged by the legislator in the UK and in Ireland, where statutory acts regulating copyright prescribe that the author of a computer-generated work is "*the person by whom the arrangements necessary for the creation of the work are undertaken.*"[139]

Nevertheless, the following sub-chapter will explore available doctrinal opinions on the issue, thus seeking to explore the shortcomings of this approach, especially when put in the context of artificial intelligence. While scholars so far explore this solution from the perspective of computer-generated works, the following subchapter puts their argumentation against AI in an effort to confirm or disprove their stance. The first part of this sub-chapter will focus on the programmer as a possible author of works, created by AI, and the second part will focus the attention on the user.

3.2.1. The programmer[140]

The main argument that makes the case for the programmer to be held as author is based on their proximity to the creative process and their understanding thereof. The idea here is that while the programmer is not the de-facto maker of the work, they are the ones who understand

[137] Margaret Boden, Precis of "The Creative Mind: Myths and Mechanisms", Weidenfeld & Nicolson, London, (1990)
[138] See previous chapters;
[139] Article 21(f) of the Irish Copyright Act (n.54), reading: *"In this Act, "author" means the person who creates a work and includes: […] in the case of a work which is computer-generated, the person by whom the arrangements necessary for the creation of the work are undertaken; […]"*, as well as Article 9(3) of the UK's Copyright act (n.55), reading "*In the case of a literary, dramatic, musical or artistic work which is computer-generated, the author shall be taken to be the person by whom the arrangements necessary for the creation of the work are undertaken."*
[140] It is important to note that for the purposes of this thesis and due to brevity considerations "programmer" shall be used as an "umbrella term" uniting all stakeholders involved in creating the AI – from the actual programmers who have written the lines of code to the investors who have funded the process. Exploring how authorship would be divided between these stakeholders based on contractual and statutory prescriptions would dilute the focus of this thesis and unnecessarily increase its volume. Finally, while "designer" and "creator" may be semiotically better terms, this thesis utilizes "programmer" to stay true to academic context.

how the algorithm works and can explain the creative process behind the output[141]. Or simply, as Sorjamaa explains - by virtue of being the creator of the AI algorithm, the programmer is entitled to the benefits from it.[142] Due to the fact that the programmer has invested time and efforts in designing and creating the complex software that creates the final work, they should be awarded with the positives that come from being the author. Rules of causation, "*intuition and the principle of transitivity*"[143] advocate for such a solution[144] - without the programmer and their creativity, the artificial intelligence would not have created the copyrightable output[145].

Another major argument that supports this solution is the core idea of copyrights – by granting authorship and associated exclusive rights copyrights seem to incentivize further creative development and production.[146] Therefore, the creator of the AI is the one who should be rewarded and thus encouraged to develop the creative powers of artificial intelligence.

Argumentation for the thesis developed in this part, can also be found in some specific court cases that have considered the issues of authorship when copyrightable objects were created by algorithms in video games and as part of the game. For example, in the Nova Productions Ltd v Mazooma Games Ltd.[147] – a case regarding an infringement suit between two electronic pool games creators, the UK Royal Court, amongst other things, attributed authorship to the programmer who has created the infringed elements of the infringed video game. Another example in this regard are cases such as Atari Inc. v. North American Philips Consumer Elec. Corp.[148], revolving around the famous "Pac-Man" game and, regarding the USA, Williams Elec. Inc. v. Arctic Int'l. Inc[149], revolving around the game "Defender". In these cases, contrary to the then mainstream legal considerations, the American courts held that copyright had to be bestowed upon the owner of the copyright in the software that creates the disputed in-game images and displays. In all of these cases it was the programmers' understanding and explanation of their product that lead to the court's decisions.

[141] Perry and Margoni (n.40), p.10;
[142] Sorjamaa (n.51), p.45;
[143] Quotation from Birdy (n.22), p.8;
[144] Ibid.;
[145] Birdy (n.23);
[146] Perry and Margoni (n.40);
[147] *Nova Productions Ltd v Mazooma Games Ltd*., [2007] EWCA Civ 219, Royal Courts of Justice, Court of Appeal, London;
[148] *Atari Inc. v. North American Philips Consumer Elec. Corp.*, Case 672 F.2d 607 (7th Cir. 1982), U.S. Court of Appeals for the Seventh Circuit;
[149] *Williams Elec. Inc. v. Arctic Int'l. Inc.*, Case 685 F.2d 870 (1982), U.S. Court of Appeals for the Third Circuit;

While these considerations and case rulings rest on sound logic and longstanding legal traditions like Lockean ethics and "sweat of the brow" doctrine, they are only applicable to cases where the logical connection between programmer and creative output of the program they wrote is visible. These cases are emanations of Ada Lovelace's[150] understanding that a machine "*can do (only) whatever we know how to order it to perform.*"[151] Put in simpler terms – the notion that copyright in the output of a program shall be awarded to the programmer who created it is viable and feasible only in those cases when the genetic and functional relation between human and machine can be explained and understood.

Conversely, such construct seems to be questionable in cases where the AI acts as a black box[152] and its "creative" decisions cannot be explained and accounted for.[153] Applying the rule that authorship goes to the creator of the software is tempting, easy and seemingly intuitive. Nevertheless, it negates the factual constellation of the matter and ignores both the purely machine origin of the creative work as well as the fact that the programmer has limited control over and little to no understanding of the factual creative process.[154] This does not sit well with EU law, where authorship is attributed based on, amongst other things, the author's personal imprint on the work. The creative process of neural networks and other black-box-like algorithms has little to no link to the programmer, thus eliminating his influence on the creative process and ultimately questioning whether the algorithm's output can bear the programmer's personality.

Transcending Ada Lovelace's skepticism towards machine creativity, the technological development in the subject matter disconnects the human from the creative process. Therefore, cases where programmers and software engineers' explanation of the algorithmic *modus operandi* cannot account for the final copyrightable product challenge contemporary copyright institutes.

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[150] Ada Lovelace, usually deemed as one of the first tech visionaries, is a scientist lived in the second half of the nineteenth century. AI skeptics would usually quote her sound understandings of the limits of machines capabilities; For more information on Ada Lovelace see for example Betsy Morais, "Ada Lovelace, The First Tech Visionary", The New Yorker, (USA, October 2013);

[151] Quotation from Birdy (n.22), note 59 – part of Ada Lovelace's reserved response to the potential of Charles Babadge's proposed Analytical Engine.

[152] Term is not set in the doctrine or practice. It is a mere elaboration on the information on the way AI functions gathered from sources such as Pei Wang's "*What Do You Mean by AI*?". Here "black-box-like" implies the inability for human influence on the creative process of an AI that employs some machine learning technique.

[153] See previous chapters;

[154] Birdy (n.23); also - Nilsson (n.44), Ch. I, part 2;

Birdy sees a way out of this predicament in the application of either the "derivative work" doctrine or in the "work-for-hire" doctrine[155]. The "derivative work" approach expands authorship to the person, who has created a work based on some form transformation, recasting or adaptation of one or more previous original works[156]. In practice, this would mean that the programmer would be the author of the AI's creative output based on the fiction that the creative output is derived from the AI itself. While initially appealing in its simplicity this, Birdy argues, would fail to resolve the issue at hand, as traditional interpretations of the doctrine require the new creation to "*contain material from the preexisting work*".[157] Applied to any creative output that has been created by software, beside software, this approach is destined to fail as it is obvious that output in the form of music, for example, is built of notes rather than lines of code.[158] As Samuelson points out, computer-generated works do not incorporate an expression of the database they rely on for the creative process[159], thus rendering the "derivative work" idea inapplicable.

Seemingly simple, the application of the "work-for-hire" is also not without faults. According to this common law legal institute author of the created work is deemed not the person who has actually created it, but the person who has hired the *de facto* maker and commissioned the work. Appropriation of the traditional constellation of the doctrine would mean that the AI shall take the place of the *de facto* maker, thus bestowing authorship to the programmer and avoiding the issue of vesting machines with rights.[160]

Yet, when applied in practice, this approach will reveal at least two significant downsides. First of all, the work-for-hire doctrine is a legal fiction in the legislations of the US that deviates from the core principle of copyright that the de-facto maker is the author. Therefore, it has strictly defined and interpreted borders that prescribe what types of works and in what cases could be subject to "hiring"[161]. Works created by computers and/or forms of AI do not fall under

[155] Nilsson (n.44), Ch. I, part 2;
[156] Murray (n.6), Ch. 3; Similarly - Bulgarian Office on Intellectual Property, "*Materials for Preparation for IP Representative exam*", Sofiapress, (2014), Ch. 5;
[157] See Birdy (n.22), note 190, which explains the Montgomery case where these requirements are set.
[158] Perry and Margoni (n.40);
[159] Samuelson (n.44);
[160] Birdy (n.22);
[161] See Title 17 of the United States Code, art. 101 (1) and (2), which lay down the requirements for the types of works that could be "made for hire" as well as the categories of relations where such an approach is applicable. See also *Community for Creative Non-Violence v. Reid*, 490 US 730 [1989], Supreme Court of the United States, where the court elaborates on the interpretation of the work-for-hire definition. Finally, a better explanation of these two articles can be found in the leaflet by the US Copyright Office, accessible at this link: https://www.copyright.gov/circs/circ09.pdf;

any of these categories. Moreover, work-for-hire requires a contractual relation between de-facto maker and beneficiary, which in the cases of creative algorithms is impossible due to their lack of personhood. Finally, the work-for-hire doctrine is, to an extent and in some forms[162], known in continental legal systems, but with the important exception, that authorship is an intransferable title due to its moral character. Simply said – in continental legal systems that were formed under the *droit d'auteur* doctrine authorship would usually not be transferred to the employer (or commissioner of the work), but only the economic complex of rights that is derived from authorship[163]. This in turn would make the AI author rather than the programmer.

Finally, in the light of moral issues with attributing authorship to the programmer, a probable power imbalance must be pointed out. Given the fact the creating creative artificial intelligence, which uses "black-box" approach or techniques like "machine learning" to produce copyrightable output is a task involving considerable financial and computational resources, it is reasonable to anticipate that such AIs would be created by companies that can provide said required resources. For example, DeepMind started its endeavor to "solve intelligence" in 2010, yet its most significant successes came after the company was bought by Google just a year after its creation[164]. Granting authorship to the programmer would, on the one hand expand copyright's scope to output that is questionably human in origin, thus contradicting the core principle of general Intellectual Property laws that protection is granted to the results of human's intellectual labor.[165] On the other hand, as Samuelson notes, allowing the programmer to claim authorship over the creation of their creation would lead to programmers being unjustifiably rewarded twice[166] - once for creating the AI and then for its outputs.

3.2.2. The User

The arguments that support the statement that authorship could be granted to the user of an algorithm rely on the notion that the user utilizes the machine as a tool in the process of expressing their own creativity. This logic is in-line with the Lockean-influenced systems, as well

[162] Sarakinov (n.10), Ch. 3, where the author explains that German and Bulgarian law acknowledge works made for hire as the so called "employer exception", which has strictly defined limits;
[163] Ibid.;
[164] More information on DeepMind's history available on the website.
[165] See Articles 1 to 4 of the Berne Convention, art. 52 (2) of the European Patent Convention, which imply that IP Legislation regimes protect human products and not facts, discoveries, natural occurrences, etc.
[166] Samuelson (n.44);

with the more dignitarian legal understandings of continental Europe[167] and is based on the idea that the person who created something by using a tool of any sort shall be rewarded with authorship over their creation. The causation link between the tool's user and the end-product was visible and the user's involvement was sufficient. A *conditio sine qua non*. Without the user, the tool would never have created on their own.

Today, when creative output can be mediated by a single click of a button this concept is called into question – both by common sense, as well as by scholars[168]. When the user's input can be reduced to a mere click of a button, it is hard to justify that it constitutes the creation of an original work or transmits the user's own creativity and individuality. The same logic was employed by the court in Nova Productions Ltd v Mazooma Games Ltd.[169] the Court employed similar logic when assessing the user's contribution. While acknowledging the user's involvement – to provoke and actuate the creative powers of the algorithm, the court found this involvement insufficient to invoke attribution of authorship and consequently ownership. The judge stated that the player's "*input is not artistic in nature and he has contributed no skill or labour of artistic kind. Nor has he undertaken any of the arrangements necessary for the creation of the frame images. All he has done is to play the game.*"[170]

In a more modern context, videogame engines have replaced pre-set graphic options and closed worlds with open-worlds run by complex intelligent algorithms.[171] In such open-world videogames, upon user-initiated interaction the AI randomly creates randomly creating objects and real-world or game-world-like scenes surrounding the player.[172] Without any user intervention in the process, the AI creates an aesthetically pleasing in-game world for the player to explore, where many of the displays are crated in the moment and may qualify for copyright protection.[173] While technically impressive this example is another confirmation of the logic employed by the court in Nova Productions. Adapting these examples to the standard of "the

[167] Alexander and Moore (n.12);
[168] Samuelson (n.44), Birdy (n.22, 23), Thomas Margoni (n.40, 49), Sorjamaa (n.51);
[169] *Nova Productions* (n.70);
[170] Ibid.; Quotation of the court case from Sorjamaa (n.51)
[171] Aron Canary (programmer at Volition Studios) at the 2014 Game Developers Conference, Panel "Free-Range AI: Creating Compelling Characters for Open World Games". Briefing on the presentation available here: http://www.gdcvault.com/play/1020110/Free-Range-AI-Creating-Compelling; See also Nick Hall, *"Eight Ways AI Makes Virtual and Augmented Reality Even More Real"*, (Topbots, 13.05.2017);
[172] Alexander Nareyek , "*AI in Computer Games"*, 10 ACMQueue magazine, Vol. 1 (2004); More contemporary argumentation and interpretations - Canary (n.93);
[173] Currently the engine of the game Skyrim and other games developed by Bethesda that employ the same engine do that;

author's own intellectual creation"[174], reveals yet another possible fail of the argument in favor of the user, since it is questionable how the output of the AI's work bears the individuality of the user.

Minimal user involvement can also be inferred in the more modern context of creative artificial intelligence - by using Google's AutoDraw[175] and Quick Draw[176] algorithms[177]. Essentially, these initiatives rely on the same technology – in the "Quick Draw" project google used user's input to teach an algorithm to recognize patterns in drawings and thus recognize objects. A regular visitor to the website would draw some random objects within a tight timeframe, while the algorithm flawlessly recognizes what the user is drawing. Later, the same technology was used in the AutoDraw project where people are randomly drawing (or rather scribbling) an object and based on patterns in drawing the algorithm recognizes the object and proposes to replace the scribbles with a pre-stored professionally-looking drawing.[178] In many cases, this human-machine interaction may be condensed to minimal input just to provoke the algorithm to propose the needed object, thus lowering user input and their creative involvement in the process of crafting the professionally looking and detailed image. [179]

Another downside to the user being granted copyright in the works created by AI is, in Samuelson's view, this concept's infeasibility due to doctrinal and policy reasons[180]. Such allocation of authorship would undoubtedly diminish the incentives for programmers to create, as it would lead to the user practically "free-riding" on the programmer's skill and effort[181]. In terms of copyright policy "user-authorship" may have a negative impact, eventually becoming a deterrent for the programmer's creative strives. In the context of today's increasingly autonomous algorithms continuation of this concept would mean that copyrights are awarded to one person on the expense of the programmer based on a misguided sense of staying true to legal traditions.

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[174] *Infopaq* (n.67) par. 91; *Eva-Maria Painer* (n.63), par. 36;
[175] Available at https://aiexperiments.withgoogle.com/autodraw;
[176] Available at https://quickdraw.withgoogle.com/;
[177] More information in Chapter 2; Also see Frederic Lardinois, "*Google's AutoDraw uses machine learning to help you draw like a pro"*, (TechChurch, 2017);
[178] *Ibid.*;
[179] This example may fail on the merits that judging someone's creativity and their involvement in the process may be arbitrary, or on the grounds that some preset "stock" images are present in almost any graphic design software and serve the purpose to promote and not stifle user's creativity. Nevertheless, it gives a good impression of where machine learning and algorithm creativity are headed
[180] Samuelson (n.44);
[181] Sorjamaa (n.51);

Finally, it is worth noting that some authors would even go further and declare the concept of authorship as problematic.[182] Grimmelmann suggests the issue of the author's involvement is not new and does not pertain solely to computers. Since all works might have been assisted or in a way generated by computers and algorithms, the author suggests distinguishing between human-made and machine-made works is obsolete as the problem lies in the core concept of authorship.

In conclusion, it seems that what the doctrine has proposed as a viable solution to issues of computer-generated works may not adapt well to the essence of AI. While currently attributing authorship of AI-generated work to the programmer or user may seem like a niche-question that may be overlooked with no significant practical consequences, advances in the subject-matter or AI suggest that it may turn into a pressing issue quite soon. A change in perspective, policy and reasoning may only be matter of time.

3.3. AI as an author – alone or jointly

Currently the idea of machine-authors sounds impossible[183] and is a topic only for legal scholars to explore and create theoretical knowledge. While legal practitioners acknowledge the pending change in significant copyright constructs, surprisingly a change in the perspective towards authorship is not amongst the challenges that artificial intelligence bears.[184] Therefore, it is easy to understand why the points discussed in the following part are largely theoretical.

Yet, these considerations are not devoid of importance, as they create anticipation of the implications of future changes. It is important to note here that the main, and probably only benefit of machine-authorship, is that it follows the core logic of IP rights that the creator is the author. Turning machines into authors would eliminate the need of complex legal solutions that assign authorship to subjects that have not participated in the creative process.

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[182] James Grimmelmann, "*There is No Such Thing as a Computer-Authored Work – And It's a Good Thing, Too"*, 39 Columbia Journal of Law & the Arts 403 (2016) Available at SSRN: https://ssrn.com/abstract=2699862;
[183] Ibid.;
[184] Bradford K. Newmann, "*Artificial Intelligence Poses a Greater Risk to IP than Humans"*, (TechChurch, 31.12.2015), accessible here: https://techcrunch.com/2015/12/31/artificial-intelligence-poses-a-greater-risk-to-ip-than-humans-do/

Andrew Wu argues that assigning authorship to AI is possible and permissible under specific circumstances:

- The AI must produce works that are not anticipated;
- There must be no human interaction ensuring the algorithm acts independently;
- The AI has the ability to decide when to produce future works.[185]

By applying a matrix of human creativity to machine creativity, he implies, that machines can be deemed authors only when they become autonomous and self-aware on a human-like level. At this point such a high standard seems hardly achievable. Admittedly, some forms of artificial intelligence can mimic human creativity[186], thus implying the question whether originality-based standards for copyright protection are able to accommodate machine authorship.

Yet, there is enough argumentation against the notion of machine authorship and the first argument in that regard is that machines lack autonomy. Authorship generates ownership rights[187], and rights are usually executed at the sole free discretion of their bearer. This means that a machine needs to be able to autonomously decide when and how to exercise its rights as an owner, in order for machine authorship to be a feasible concept. Translated in legal terms, an algorithm needs personhood in the eyes of the law to be legally deemed "author"[188]. For the sake of completeness, it must be noted here, that currently the European Commission has opened a discussion and initiated developments of policies regarding granting rights to robots. While this is a process with an end-resolution still in the making, it illustrates that the Commission is aware of the advances in AI and robotics and is looking to address the issue.[189]

Drawing on the autonomy requirement, machine authorship also does not sit well with both European and US creativity standards. While in the current US standard for creativity is somewhat unclear and may allow for some flexibility, the CJEU's position seems an unsurmountable hurdle. Admittedly, AI-generated works may meet the requirement for the work

[185] Andrew J. Wu, "*From Video Games to AI: Assigning Copyright Ownership to Works Generated by Increasingly Sophisticated Computer Programs*", AIPLA Quarterly Journal (1997);
[186] The New Rembrandt Project for example;
[187] Ginsburg (n.34);
[188] EU Parliament, Press releases, Plenary Session – "*Robots and artificial intelligence: MEPs call for EU-wide liability rules*", (February 2017); Also - Alex Hern, "*Give Robots Personhood Status, EU Committee Argues",* (The Guardian 12.01.2017);
[189] For more information see this link http://www.europarl.europa.eu/news/en/press-room/20170210IPR61808/robots-and-artificial-intelligence-meps-call-for-eu-wide-liability-rules;

to be the result of "free and creative choices"[190]. Yet, drawing on the "imprint of the author's personality", it is obvious that a machine would have to possess "human-like-personality" in order to be deemed author in the EU.[191]

On a more general copyright policy level, machine authorship contradicts one of the general purposes of IP Law - to provide incentives for authors to create more and thus expand creative expressions and knowledge and benefits society[192]. Machines, on the other hand do not need incentives to create, especially within Wu's high standard paradigm. An algorithm that, allegedly, is autonomous enough to decide on its own when and why to produce a creative work would most likely not be inspired by incentives[193], which in turn may lead to decrease in societally beneficial works[194]. Further, machine authorship will leave stakeholders unrewarded. For example, the programmers would be deprived of rights that are currently associated with their creative labour, thus discouraging them to program artificially intelligent algorithms.

In the context of machine authorship the doctrine also explores the possibility for joint authorship between programmer and algorithm.[195] The benefits of this model should allegedly eliminate the difficulties of vesting machine with rights by transferring all rights derived from authorship to the human co-author, while leaving the algorithm with the "empty" title of author.

Yet the downsides of this approach outweigh its benefits. First, construed in this way joint authorship is more a simple acknowledgement of the facts, rather than real application of joint authorship. This in turn opens the gate, as Samuelson notes, for other relevant stakeholders, i.e. the provider of the hardware that runs the algorithm to claim authorship and associated rights[196]. Finally, joint authorship, whether in common law or continental law jurisdictions, usually requires the contributions of the authors to be distinguishable, which in the cases of complex computational techniques such as machine learning would be close to impossible. The inability to trace back the individual input in the final product puts analysis back in the starting point, rendering the applicability of joint creation inapplicable.

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[190] *Infopaq* (n.67) par. 91; *Eva-Maria Painer* (n.63), par. 36;, etc.

[191] It is beyond the scope of this thesis to deliberate on the idea and merits of what "personality" is, how it is construed, etc. The observation here is done with the purpose to illustrate how high the CJEU's standard is when related to computers and artificial intelligence.

[192] Kur and Dreier (n.7), Ch.4;

[193] Sorjamaa (n.51);

[194] Wu (n.19);

[195] Ibid. and Wu (n.20);

[196] Samuelson (n.44);

3.4. No author and no Copyright

Leaving a work with no author is practically impossible in logical and legal terms. Boiled down to its essence authorship is the genetic connection between creation and creator, which exists outside of legal prescriptions. This means is that no creation is without an author.

This part of the chapter discusses the possibility for leaving the work of a creative AI in the Public Domain and also introduces this paper's opinion on how to deal with AI-generated works.

Leaving the creation of a creative AI in the Public Domain is an easy and simple thing to do and follows the natural logic of copyrights. The Public Domain is formed by works whose term of protection has expired, by works whose authors are unknown, by works that do not meet the criteria for protection, etc. It is the place where authorship is a mere signifier, deprived of any legal consequences such as ownership and exclusive rights. Put in simpler terms, while the authors of the works in the Public Domain may be known, the works themselves are not under copyright protection. A perfect example that copyright is the exception and unlimited creativity is the rule can be found in the EFTA court's[197] opinion: "*Once communicated, creative content belongs, as a matter of principle, to the public domain. In other words, the fact that works are part of the public domain is not a consequence of the lapse of copyright protection. Rather, protection is the exception to the rule that creative content becomes part of the public domain once communicated.*"[198]

Some authors see in this approach a contradiction to copyright's main goal – to create benefits for society[199]. Conversely, they are of the opinion that leaving AI-generated works unprotected will diminish the incentives to invest and develop AI technologies, ultimately leaving society worse off. Yet, this paper adheres to the opinion of Perry and Margoni[200] and other

[197] The court to the European Free Trade Association. has jurisdiction with regard to EFTA States which are parties to the EEA Agreement (at present Iceland, Liechtenstein and Norway). The Court is mainly competent to deal with infringement actions brought by the EFTA Surveillance Authority against an EFTA State with regard to the implementation, application or interpretation of EEA law rules. More information on the court at this link: http://www.eftacourt.int/

[198] *Norwegian Board of Appeal for Industrial Property Rights v. The Municipality of Oslo,* Case E-5/16 – appeal from the municipality of Oslo, The Court to the EFTA, par. 66

[199] Sorjamaa (n.51);

[200] Perry and Margoni (n.40);

scholars[201], who see the Public Domain as a balancing counterweight to copyright's over-expansion as well as an important inspiration for human creativity.

For the following reasons, this paper finds that works created by artificial intelligence have to be left in the Public Domain. First, they will serve as a valuable pool of inspiration, which creative individuals may use without fearing copyright infringements. Further in this chain of thought, the bigger the Public Domain is, the more power it has to balance out the expansion of copyrights[202]. As the previous parts of this chapter show, assigning authorship to the human in the equation may unjustifiably expand copyrights over works that were not created by them. Given the AI's potential for unlimited creation of works, it is easy to imagine a rapid and unbalanced growth in AI-generated copyright-protected works that will ultimately hinder free imitation and creation.

One may argue that exporting the output of creative AIs in the public realm would deprive many related stakeholders of the reward they expect and deserve[203]. After all, developing and deploying a form of creative AI is a long, time-consuming and financially expensive endeavor and all parties involved are entitled to economical gains in order to benefit from the whole project. What this argument misses, though, is the motivation of such projects as well as where their real value lies. It is logical for initiations like "The New Rembrandt" to seek returns from the creative artificial intelligence they have developed, rather than from the product thereof. The value here lies with the AI created and, bearing in mind the time and financial investments put in such projects, one can assume that creative AI today is created to challenge humanity's conceptions of creativity and intelligence, rather than to extract economic gains.

Finally, in the doctrinal analysis presented so far, this paper sees an inexplicable omission. While all authors have extensively debated the possibility for regulating creations of computers and AI with traditional statutory means[204], they all seem to have forgotten about the Open Source and Copyleft initiatives. The principles of the Open Source movement coupled with

[201] Clark Asay, "*A Case for the Public Domain*", 73:X Ohio State Law Journal (2012), chapter 4; Timothy Armstrong, *"Shrinking the Commons: Termination of Copyright Licenses and Transfers for the Benefit of the Public"*, 47 Harvard Journal on Legislation (2010);
[202] Margoni and Perry (n.49);
[203] Samuelson (n.44) and Sorjamaa (n.51);
[204] All relevant authors have focused on statutory tools in their respective copyright system – Birdy (n.22, 23) focuses on the "work for hire" doctrine, Margoni (n.40) focuses on the "derivative work" doctrine, Wu (n.19, 20) debates joint authorship possibilities, etc.

the idea of assigning the output of the creative AI to the Public Domain is, in this paper's opinion, the solution that would benefit all interests involved.

So far Copyleft and other relevant OSS variations have proven themselves to be best suited to accommodate and deal with software[205]. Instead of trying to appropriate conservative legal constructs looking to best adapt them to the new challenges of the software world, applying OSS logic to the issue has the benefit of putting related subject matter where it belongs and best thrives. From a policy perspective, releasing the creative AI under an open license will foster innovation and creation as it will give the chance for stakeholders interested in the subject to create their own version of artificial intelligence.

One may argue that releasing the AI under an open license would diminish the creator's reward, which is in turn contrary to the idea of copyright to reward the creative individual. While gains from open sourcing are in themselves not as significant as closed-license businesses, it should be reminded that at this point AI is created as answering a challenge and proving that machines can also be creative and intelligent, rather than for any direct economic rewards.

Finally, open-sourcing the AI would benefit some current legal systems which deal with the issue of authorship over "computer-generated works". One of the flaws of Art. 9(3) of the UK's Copyrights, Designs and Patents Act is that it doesn't distinguish between different interest and stakeholders, i.e. the programmer and the user, thus leaving the possibility for multiple stakeholders having a viable claim of authorship over the output of the AI. Copyleft licenses, on the other hand, oblige their beneficiaries to improve, change or re-utilize open-sourced software, which effectively merges the programmer and user into one legal or natural person, thus diminishing the inherent ambiguity of the regulation. This means that, in order to improve the AI, the person, who acquires it under the open source license, would commonly have to re-program or at least edit the code behind it, thus becoming the programmer of the "new" AI. When the one who uses and the one who programs the algorithm conflate, such prescriptions would point to one single author.

[205] Brian Craver, "*Share and Share Alike: understanding and Enforcing Open Source and Free Software Licenses*", vol. 20 of Berkeley Technology Law Journal, 443 (2005)

3.5. Concluding remarks

Researching the doctrine and existing legislation regarding who should be deemed the author of work created by an artificial intelligence revealed that copyright has always been challenged by technological developments. Putting existing solutions to the issues of "computer-generated works" through the prism of AI's challenges, reveals how the latter exacerbates the flaws in the same solutions. It is in the author's opinion that the best way of resolving the issue of authorship over AI-generated works is to leave them in the Public Domain for society to enjoy and draw inspiration from. Finally, while AI developers are still enchanted by the quest to solve creativity and intellectuality, proliferation and development of more advanced forms of computational intelligence can best be achieved by opening the access to the software behind machine creativity.

Conclusion

In the 2004 big screen adaptation of Isaac Asimov's 1950 novel "I, Robot" there is an interesting scene that precisely depicts the relation between man and machine in terms of creativity. In this scene, while interrogating the AI robot the protagonist doubts its ambition and ability to be or even pretend to be human. To illustrate his point, Will Smith's character rhetorically asks the machine "Can a robot write a symphony? Can a robot turn a canvas into a beautiful masterpiece?" The robot wittily and equally rhetorically responses with a simple, yet syncoping "Can you?!"[206], thus calling into question the pivotal relation between being human and being creative. The movie implies that creativity and authorship are bound by an irrevocable genetic bond that is seemingly preserved for and inherent to human beings only.

In legal terms, this implication is essential. The attribution of authorship is a central question with important implications on many levels – for law in general, authorship is the basis for attribution of ownership rights; from a more societal and philosophical perspective the genetic connection between creator and creation is part of what makes us human. As such, authorship is at the core of both laymen and scholars' understanding of who has what rights to what objects. Spawned as a by-product of the battle for copyright supremacy in the early eighteenth century, authorship has evolved to an elaborate concept that satisfies moral and economical expectations such as the *droit d'auteur* doctrine as well as Lockean understanding of rights in one's labour. Rooted in the idea of the "romantic author" today's legal interpretation of authorship is closely connected to "originality" and "creativity". In strictly legal terms, it is these standards that determine whether machine creativity and authorship are going to stay on the pages of academics' articles or achieve some practical realization.

Recent technological developments[207] have contributed to a shift in the perspective on what "being an author" entails. Be it with the philosophically charged emotional statement of the death of the author or with the subtle complexity of artificial intelligence – it seems that creativity as we know it is not reserved for human's mind only. Projects like "The New

[206] Twentieth Century Fox Film Corporation et al., "I, Robot", (USA 2004); Link to the film's IMDB page can be found here http://www.imdb.com/title/tt0343818/; An excerpt of the quoted scene can be found under this link: https://www.youtube.com/watch?v=05bGPiyM4jg

[207] See chapter 3;

Rembrandt" and algorithms like StackGAN prove that creative process and output are not a product of an unfathomable blessing of muse, inspired by some intellectual or emotional state, but conversely are a complex, yet understandable mixture of patterns and relations that rely on qualitative and quantitative aggregation of knowledge.

Evidently, artificial intelligence has the potential to change and shape human life for decades to come. Assuming such an ambitious and potentially society-shaping role undoubtedly foretells that machine-intelligence will essentially change core cultural, ethical, and legal concepts. By discussing the possibilities to assign authorship in the cases where an AI has created a copyrightable object, this thesis showed what the legal possibilities are for legal systems based on common and continental law to facilitate AI's disruptive powers in the realm of creativity. Drawing on the analysis of contemporary scholars, this paper reveals that adapting long-standing statutory legal constructs may not be able to accommodate the creative potential of intelligent algorithms without hindering legal interests and policy expectations of relevant stakeholders. Instead, this thesis deems a combination of open source licensing and the incentivizing creativity pool of the public domain to be a better solution to the legal issues posed by AI's creations. Leaving the work of the algorithm in the public realm is also in line with current high standards for creativity and in the same time creates a needed counterweight to the expanding scope of copyrights. In the author's opinion allowing for a more open access to the AI will increase the development and investments in the new technology, thus ultimately benefiting society as a whole.

Going back to the scene in "I, Robot", today it seems that in terms of creativity machines and people are already on the same level, since, in abstract terms, both are now capable of turning a canvas into a beautiful masterpiece. Creativity is no longer a realm strictly reserved for and ruled by humans, and while thirteen years ago this may have been implied in Sunny's answer, today it is increasingly becoming a reality.

In conclusion, for the past several decades scholars and scientists have generally recognized AI's potential but calmly dismissed the issue as unrealistic or dead in its infancy. As argued in this paper, AI's presence in human life is no longer a beautiful and uncertain promise, but a very real part of our daily lives, and the effects thereof are already visible and accessible to the public. Ultimately, this thesis implies the immense importance of this seemingly easy to neglect issue – AI is not challenging just a simple legal construct, but a societal concept with proportions of philosophical significance. To a certain extent, when disrupting the genetic

connection between creator and creation, AI is actually calling into question basic constituent elements of what makes us human, our individuality and personality.

To end on a positive note, computational creativity and artificial intelligence should not be about society fearing the realization of its worst nightmares. On the contrary, they must be about humanity unleashing its potential and daring to imagine a brighter and more creative future.

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