Human Intellectual Creations in European Patent and Copyright Law

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ABSTRACT

This thesis responds to the emergence of AI-driven systems capable of producing expressive and technical subject matter. If realised, such a subject matter is often indistinguishable from works and inventions—human intellectual creations.

Historically, copyright and patents have been reserved for human intellectual creations, ie subject matter directly and immediately created by human beings. This thesis argues that this should remain so. Preserving this restriction requires clarification of the nature of authorship and inventorship. Hence, this thesis fleshes out human authorship and human inventorship in terms of quality, quantity, specificity, and their involvement in a circumscribed process of creation.

The main contribution of this thesis lies in exposing the shortcomings in the European authorities' adjudication and examination practices, namely that the human origin of intellectual creations is traditionally inferred from their expressive form or technical character. Given the advancements in AI, such inferences are no longer legitimate. This is significant because if the authorities are unable to distinguish human intellectual creations from other subject matter (albeit expressive or technical), they run a risk of granting protection where none is lawfully permitted or justified.

To mitigate this risk and address the shortcomings, this thesis recommends interpreting the statutory copyright subsistence and patentability criteria in the light of the implicit requirements for protection: human authorship and human inventorship. This thesis further proposes refinements of the conceptions of human authorship and human inventorship at the level of detail necessary to tackle the disruptive role of AI in the processes of creation. Finally, it recommends extending the disclosure duties of those who demand protection.

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But people who use erudition to write for a learned minority and are anxious to have Persius or Laelius pass judgment don't seem to be favoured by fortune but rather to be pitied for their continuous self-torture. They add, change, remove, lay aside, take up, rephrase, show to their friends, keep for nine years and are never satisfied. And their futile reward, a word of praise from a handful of people, they win at such a cost – so many late nights, such loss of sleep, sweetest of all things, and so much sweat and anguish. Then their health deteriorates, their looks are destroyed, they suffer partial or total blindness, poverty, ill will, denial of pleasure, premature old age, and early death, and any other such disasters there may be. Yet the wise man believes he is compensated for everything if he wins the approval of one or another purblind scholar.

Desiderius Erasmus
In Praise of Folly

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AI .....Artificial intelligence

AI-driven system .....A system based on any of the AI techniques

AI and IP debate.....A debate in intellectual property law about the implication of advancements in AI

Berne Convention .....Berne Convention for the Protection of Literary and Artistic Works (Paris Act of 24 July 1971), as amended on 28 September 1979

CDPA .....Copyright, Designs and Patents Act 1988

CGW …… Computer-generated works

CJEU .....Court of Justice of the European Union

Computer Programs Directive .....Directive 2009/24/EC of 23 April 2009 on the legal protection of computer programs [2009] OJ L 111/16

Database Directive .....Directive 96/9/EC of 11 March 1996 on the legal protection of databases [1996] OJ L 77/20

French Intellectual Property Code.....Code de la propriété intellectuelle

EBA .....Enlarged Board of Appeal of the European Patent Office

EPC .....European Patent Convention 2000

EPO .....European Patent Office

German Author's Rights Act.....Urheberrechtsgesetz of 9 September 1965 (BGBl I S 1273)

German Patent Act .....Patentgesetz of 16 December 1980 (BGBl 1981 I S 1)

InfoSoc Directive	Directive 2001/29/EC of 22 May 2001 on the harmonisation of certain aspects of copyright and related rights in the information society [2001] OJ L 167/10
LDMA	Literary, dramatic, musical, or artistic work
MLA	Machine learning algorithm
Paris Convention	Paris Convention for the Protection of Industrial Property 1883
PSA	Person skilled in the art
Rental and Lending Directive	Directive 2006/115/EC of 12 December 2006 on rental right and lending right and on certain rights related to copyright in the field of intellectual property (codified version) [2006] OJ L 376/28
Term Directive	Directive 2006/116/EC of 12 December 2006 on the term of protection of copyright and certain related rights [2006] OJ L 372/12
USPTO	United States Patent and Trademark Office
UK IPO	Intellectual Property Office of the United Kingdom
WIPO	World Intellectual Property Organisation

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CHAPTER I.

INTRODUCTION

> I believe we are on the cusp of an incredible new era of biological and medical research. Last year DeepMind's breakthrough AI system AlphaFold2 was recognised as a solution to the 50-year-old grand challenge of protein folding, capable of predicting the 3D structure of a protein directly from its amino acid sequence to atomic-level accuracy. This has been a watershed moment for computational and AI methods for biology. Building on this advance, today, I'm thrilled to announce the creation of a new Alphabet company – Isomorphic Labs – a commercial venture with the mission to reimagine the entire drug discovery process from first principles with an AI-first approach and, ultimately, to model and understand some of the fundamental mechanisms of life.[1]

Proclamations about modelling and understanding the fundamental mechanisms of life which evokes decoding the nature would sound too pompous to be taken seriously, had they not come from Demis Hassabis, a person with an established record of achievements in artificial intelligence ('AI').[2]

In contrast with the typical practices in drug discovery,[3] the Isomorphic Labs seems to approach 'drug discovery' not as an end (ie to discover a drug with a specific effect), but as a problem (ie how to discover drugs with *x* effect). They also seem to propose to solve the problem of drug discovery by formulating new drug discovery principles and a new meta-method of drug discovery which are more abstract than the methods applied in the context of finding a drug with specific therapeutic effects. This would mean repeating the

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1 Demis Hassabis, Founder and CEO of Isomorphic Labs (and DeepMind). Demis Hassabis, 'Introducing Isomorphic Labs' (*isomorphiclabs*, November 2021) <https://www.isomorphiclabs.com/blog> accessed 31 December 2021.

2 Hassabis founded Deep Mind and led the design of AlphaGo, the first system to ever win over a world champion at the game of Go, AlphaGo Zero which learnt to play games, incl. go, at a super-human level on its own and Alpha Fold, the only system being able to predict protein structure with required accuracy. Michael Wooldridge, *The Road to Conscious Machines. The Story of AI* (Penguin 2020) 190-99, Greg Williams 'Inside DeepMind's epic mission to solve science's trickiest problem' (*wired*, 06 August 2019) <https://www.wired.co.uk/article/deepmind-protein-folding> accessed 31 December 2021.

3 For instance, testing compounds to find therapeutic effects against a selected disease. US Food & Drug Administration 'Step 1: Discovery and Development' (*FDA*, 1 April 2018) <https://www.fda.gov/patients/drug-development-process/step-1-discovery-and-development> accessed 31 December 2021.

success story of AlphaFold2—an AI-driven system which, instead of predicting structure of an individual protein, generated a method of predicting structure of any protein and thus offered a solution to the general problem of protein folding (see above).

Moving the problem solving to a higher level of abstraction[4] to which our current patent laws are not geared is but one of the ways in which the use of AI-driven systems cause the intellectual property law screech and stutter. In addition, we observe and can admire paintings, photographs, poems, musical compositions, and performances in an improvisational play created not only with the aid of AI-driven systems but with the AI-driven systems being in the driver's seat. This observation prompts asking what the implications of mechanisation of the processes of creating and inventing are for intellectual property law.

1 THE NATURE OF THE PROBLEM

This problem has a technical and a legal side. The technical side is discussed here only to the extent necessary for accepting that the current state-of-the-art AI-driven systems present a novel challenge for European copyright and patent laws.[5] While this thesis is justified by the developments in AI and is applied to the scenarios involving an AI-driven system in the

[4] This means that the solutions are looked for at a more abstract level than usual. This thesis uses the understanding of levels of abstraction offered by Professor Floridi: 'The quantity of information in a model varies with the LoA: a lower LoA, of greater resolution or finer granularity, produces a model that contains more information than a model produced at a higher, or more abstract, LoA.' Luciano Floridi, 'The Method of Levels of Abstraction' (2008) 18 Minds & Machines 303, 315. Floridi's work was chosen for reference because it relates to the use of the levels of abstraction in simulation in computer science and artificial intelligence. ibid 305.

[5] This is not yet generally accepted. For instance, the USPTO report on Public Views on Artificial Intelligence and Intellectual Property Policy summarises that majority of respondents find the current US laws 'calibrated to correctly address the evolution of AI' and the existence of any novel problem for intellectual property laws conditional on the (potential) emergence of artificial general intelligence. United States Patent and Trademark Office, 'Public Views on Artificial Intelligence and Intellectual Property Policy' (*USPTO*, 6 October 2020) Executive Summary <https://www.uspto.gov/about-us/news-updates/uspto-releases-report-artificial-intelligence-and-intellectual-property> accessed 17 December 2021.

process of creation, it is not limited to that context nor application. Equally, despite the timeliness and relevance of this thesis being accentuated thanks to the developments in AI, the validity of the thesis does not depend on the often-disputed and still evolving capabilities of AI-driven systems.

Nonetheless, parts of this thesis concerning AI technology are necessary to identify AI-driven systems of this thesis' interest and inform a term to be used further in the thesis: human-AI productions. The AI-driven systems of this thesis' interest are such that are capable of determining expressive elements of literary, dramatic, musical and artistic works or inventive features of technical solutions without the relevant human intervention or understanding (more in Chapter II.). It is emphasised that the above definition concerns only certain kind of AI-driven systems, not all of them. This thesis adopts a functional definition of its AI-driven systems of interest, rather than ask a general question about the nature of AI-driven systems, ie whether the existing AI systems are such that require the relevant human intervention to be always present.

The term 'human-AI productions' is intended to describe outputs whose expressive form or whose technical effect has been partly or exclusively determined by an AI-driven system. The term contains a reference to 'human' to make it clear that a human being is still, in some capacity, involved in a process of creating these human-AI productions involving the AI-driven systems of interest.

These definitions leave the question of whether the human being in the process acted in the capacity of author or inventor open for a legal assessment. Equally, whether the capabilities of such AI-driven systems are realised, and they indeed determine (at least some of) the expressive or the technical elements of their outputs is a question of fact to be examined in each individual case. It is acknowledged that this is a simplification of what, in reality, may be a complex interaction of a variety and number of human and AI-driven

systems' inputs being present at different stages: from the machine learning process to the final, polishing touches on the outputs.

There are also opinions in the legal literature denying the disruptive effects of AI-driven systems (in more detail in Chapter II.). These opinions notwithstanding, a debate has been formed thanks to a lively academic interest, pending patent law cases and public consultations initiated by policy makers around the world. This debate counts on AI-driven systems having already entirely or partly replaced the human intellectual activity in creative processes. Or, if not yet having replaced it, it is will likely do so in the near future. This cause or will cause disruptions to the traditional perceptions of authorship and inventorship.

This thesis contributes to that debate and argues that human-AI productions present a novel problem for intellectual property law. For the first time in human history, human beings involved in the processes of production of literature, art or technical solutions may not be the direct and immediate creators and hence are, to some extent, disconnected from the human-AI productions.[6] This disconnect challenges our long-held assumptions about human intellectual creations and the habit of making inferences about their human origin from their expressive or technical character. Therefore, both the nature of human intellectual creations and the tests for determining whether a given subject matter constitutes human intellectual creation need to be clarified.

While here the problem of copyright subsistence in and patentability of human-AI productions is regarded as novel, certain analogies can be drawn between the present problem and other challenges which copyright and patent laws encountered in the past. Some treat the AI-driven systems as mere tools and thus similar to cameras or general-

[6] A similar observation was made by Boyden: 'Computer-generated works destabilize copyright law's approach to authorship by obscuring the connection between the creative process and the work.' Bruce Boyden, 'Emergent Works' (2016) 39 Colum JL & Arts 377, 380.

purpose computers.[7] The use of cameras and computers, however, brought about a new type of subject matter, ie a photograph and a computer program. This prompted questions whether the new subject matter belong to literary or artistic domain.[8] In contrast, it is not questionable whether human-AI productions belong to the literary or artistic domain because they take the established forms of expression (in more detail in Chapter II.). Hence, the use of AI-driven systems has different implications for copyright law than the use of cameras and computer programs does.

Some compare human-AI productions with computer-generated works and regard the debate about their potential protection as a mere protraction of a debate about protection of computer-generated works from the end of eighties of the twentieth century.[9] However, the state-of-the-art computers of that period did not possess the capabilities of today's AI-driven systems and would not have passed the Turing and Lovelace tests (more in Chapter II.). More specifically, their achievements were mediocre (a piece of code or a database)[10] and their outputs were pre-determined by hard-coded, precise instructions. Hence, the implications for copyright law are different due to the difference in the quality of the machine's input in the process of creation.

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7 Bernt Hugenholtz and João Quintais, 'Copyright and Artificial Creation: Does EU Copyright Law Protect AI-Assisted Output?' (2021) 52 IIC 1190.

8 This builds on research done by Cooper who describes the struggles of early photographers for artistic status and photography for being accepted as one of the artistic domains. Elena Cooper, *Art and modern copyright: The contested image* (CUP 2018) 15, 26 et seq. In case of computer programs, Professor Samuelson and others write about the struggles to justify the protection of computer programs as literary works. Pamela Samuelson and others, 'A Manifesto concerning the Legal Protection of Computer Programs' (1994) 94 Columbia L R 2308, 2315-20.

9 Provisions on computer-generated works were adopted also in the UK (in more detail in Chapter V.), Ireland, India, New Zealand and Hong Kong.

10 In Australia, a database without a human author was discussed in *Telstra Corp Ltd v Phone Directories Co Pty Ltd* (2011) 90 IPR 1. In the UK, a piece of code giving rise to a video game composite frames was discussed in *Nova Productions Ltd v Mazooma Games Ltd* [2006] EWHC 24 (Ch), [2006] RPC 14. In Germany, authorship by a juridical person, in the absence of authorship of a natural person, was discussed in *Satellitenfoto*, Decision of 30 May 1989, 16 O 33/89 [1990] GRUR 270.

There is also some similarity between human-AI productions and works owing their existence to multiple creators such as Wikipedia, open-source software or folklore, due to the diverse origins of the contributions and complexity in the process of creation.[11] With respect to these complex works, there are doubts about allocation of copyright because of collective authorship,[12] the nature of collaboration and sub-sequent adaptations within a certain community.[13] Despite sharing some of the concerns regarding entitlement, the human-AI productions suffer from possibly having no human creator, instead of too many human creators, and hence the implications for copyright law are different.

In patent law, patentability of natural subject matter like bacteria, a sequence of human genes or animal breeding processes seem to have posed a similar challenge as patentability of human-AI productions. The similarity lies in the potential absence of human inventor and (consequently) absence of an invention. Some understood that the implications for patent law were to establish whether biotechnology belongs to the fields of technology.[14] Others asked whether human ingenuity and sufficiently transformative acts were involved in the making of the natural subject matter.[15]

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11 Ravid and Liu, too, regard the complexity in the process of creation as a key feature of the problem. Shlomit Yanisky Ravid and Xiaoqiong Liu, 'When Artificial Intelligence Systems Produce Inventions: An Alternative Model for Patent Law at the 3A Era' (2018) 39 Cardozo L Rev 2215 (further discussed in the literature review in Chapter II.)

12 For a description of and research on the problem of collective authorship see Daniela Simone, *Copyright and Collective Authorship* (CUP 2019) 2.

13 The difficulties with attributing authorship of folklore to a specific person is cited in Agnès Lucas-Schloetter, 'Folklore' in Silke von Lewinski (ed), *Indigenous Heritage and Intellectual Property* (Kluwer Law International 2004) 296. Similarly, Professor Sherman cites (but does not defend) one of the objections against copyright in Aboriginal art. The objection is that its creator is the community rather than an identifiable individual. Brad Sherman 'From the Non-original to the Ab-original: A History' in Brad Sherman and Alain Strowel (eds), *Of authors and origins: essays on copyright law* (Clarendon Press 1994) 123.

14 *Rote Taube*, Decision of 27 March 1969, X ZB 15/67 [1970] IIC 136, 138. See also Joseph Straus, 'Biotechnologische Erfindungen - ihr Schutz und seine Grenzen' [1992] GRUR 252, 258.

15 *Diamond v Chakrabarty*, 100 S Ct 2204, 2208, 65 L Ed 2d 144 (1980) 310. Justine Pila and Paul Torremans, *European Intellectual Property Law* (2nd edn, OUP 2019) 73.

While the arguments made under the latter approach are useful for the present thesis, the problems are different. The human-AI productions are not taken directly from the nature and, in practice, are unlikely to ring the biotech bell and attract the caution that is associated with patenting natural processes or products. The so far known examples of technical solutions that are human-AI productions have an allure of technical character which makes them highly indistinguishable from human-made inventions and thus likely to remain below the radar (Chapters II., III. and IV.).

For the reasons given above (and explained in more detail in Chapter II.), the intellectual property laws and policies face an unprecedented situation—the AI-driven systems having (functionally) replaced some of the human decision-making in the processes of creation of literature, art and technology. In many cases this led to existence of pieces of literature and art without a human author that are indistinguishable from human-authored works and to technical solutions without a human inventor that are indistinguishable from human-made inventions.

2 QUESTIONS TO BE ASKED

Legal scholarship has responded to the advancements in AI in various ways, ranging from rejecting the disruptive effects of AI-driven systems' capabilities to rejecting the concepts of human authorship and human inventorship as no longer worth keeping (literature review in Chapter II). In brief, legal scholars' minds have been mostly occupied with the potential of outputs generated by AI-driven systems (of various levels of autonomy) to be granted copyright or patent protection under current laws and the desirability of such a protection, including who or what should benefit from it.

The main contribution of the present thesis lies in asking a more subtle and fundamental question, not yet seriously addressed in the legal scholarship. This thesis aims

to identify authorities' epistemic approaches to application of legal requirements for protection and evaluate whether these approaches are adequate to distinguish works and inventions made by human beings from other subject matter.

Ultimately, this thesis seeks to uncover whether human-AI productions would, in effect, end up being protected by copyright and patents even if they lacked a human author or a human inventor. Or, to ask the questions in the context in which they will naturally arise: in the event of authorship not being openly challenged, would the authorities find out that the form of expression at hand was not authored by a human being? Would the authorities detect that a technical solution subject to a patent application was not made by a human being if patent applicants were holding this information back?[16]

Naturally, it makes sense to ask these questions only if the lack of human authorship or the lack of human inventorship matter for protection by copyright or patents respectively. This is not uncontroversial in the literature. In response to the advancements in AI, some scholarship approaches the problem of lack of human author or human inventor as a pure problem of entitlement and ownership rights. Hence, this part of scholarship is focussed on to whom allocate rights in a subject matter that is otherwise treated as any other authorial work or an inventive invention.

There are copyright law scholars who think beyond the entitlement level and point to the link between the need for a human author and copyright subsistence criteria (in more detail in Chapter II). In patent law though, the link between the need for a human inventor and patentability requirements is underexplored. Therefore, before delving into the central problem of the thesis, some preliminary issues of authorship and inventorship must be resolved.

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[16] Needless to add that it is not only authorities' epistemic approaches that matter. It is also important that the public can make such a distinction and eventually use free forms of expression or technical solutions freely.

It is a central principle of modern intellectual property law that copyright and patents are reserved for human intellectual creations for the benefit of their human creators and this thesis argues that this should remain so (Chapter VIII.). To maintain the status quo, the encounter of human-AI productions and the copyright and patent laws with their human creativity underpinnings forces us to engage properly and afresh with what it means to create a work or devise an invention. This suggests leaving, for a moment, the perspective of a protected subject matter and adopt a perspective of the intellectual and creative activity preceding the subject matter, determining its existence as a human intellectual creation and thus making it qualified for protection.

Hence, this thesis first analyses the conceptions of authorship and inventorship and what they entail at the level of detail required to tackle the challenges brought by the advancements in AI. Then, it expressly acknowledges the link between human authorship and copyright subsistence criteria and human inventorship and patentability criteria. Building on the logical indispensability of the link, this thesis examines whether, and if so how, the current legal requirements for protection reflect human authorship, human inventorship or any other human aspects of creation. Finally and most importantly, this thesis scrutinises authorities' epistemic approaches to the legal requirements for protection. This is carried out with a view of determining whether they take the human aspects of creation appropriately into consideration and whether they have such methods and tools that enable them to make the distinction between human intellectual creations and other subject matter.

3 WHY ARE THESE QUESTIONS IMPORTANT?

Both copyright and patents have a statutory basis and since the authorities are bound by the statutes, they are obliged to use such epistemic approaches, methods and tools that enable

them to apply the statutory norms adequately. This thesis' focus on the authorities' epistemic approaches and their application practices is thus important for preserving coherence and integrity of the modern copyright and patent law systems. It is believed that not only coherence is good for the law and for causing respect for law, but it also helps to generate a greater good—the rule of law.[17]

From a more down-to-earth angle, if the authorities are unable to distinguish human intellectual creations from other subject matter, then the latter may end up being protected, regardless of whether they fulfil the legal requirements for protection. Eventually, this would increase the risk of copyright and patent systems generating false positives and thus depriving the public domain of forms of expression and inventive technical solutions without appropriate justification.

In addition, the authorities' epistemic approaches are of the utmost relevance to the normative questions of whether, and if so how, to protect human-AI productions. Should the protection of human-AI productions become justified, getting the epistemic approaches right is instrumental for a successful implementation of any normative proposals for their protection. To put it crudely, if the current epistemic approaches fail to make the distinction and if they are not fixed swiftly, the copyright and patent systems can be easily gamed. If, in the future, any new system is introduced to protect human-AI productions (eg by sui generis rights or neighbouring rights), and, at the same time, there are no adequate epistemic approaches in place, this change will lead to having even more systems to game.

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[17] For instance, Ion Fuller cites coherence as one of the principles of what he called 'the inner morality of law'. Jeremy Waldron, 'The Rule of Law' in Edward Zalta (ed), *The Stanford Encyclopedia of Philosophy* (*plato.stanford*, summer 2020) <https://plato.stanford.edu/archives/sum2020/entries/rule-of-law/> accessed 31 December 2021.

4 METHODS

Although this research was prompted by concerns raised by the developments in the field of AI, neither the capabilities of AI-driven systems nor defining the AI-generated or AI-assisted outputs[18] lie in the centre of its attention. Rather, it brings the concept of human intellectual creation to the fore and approaches the problem tabled by the advancements in AI from the perspective of human intellectual and creative activity necessary for there to be a human intellectual creation. This thesis thus explores the role of inventors in devising an inventive invention and the role of authors in creating an authorial work by means of doctrinal research. It unpacks the conceptions of human authorship and human inventorship and aims to refine them so that they can be useful also in the novel context.

After having researched authorship and inventorship in positive law, this thesis traces human aspects of creation in the copyright subsistence and patentability requirements. It does so with the aid of descriptive and interpretative analyses of the requirements for a work, originality, an invention and inventiveness. The sources of these requirements, the statutory texts are given purposive interpretation,[19] and the international treaties are construed by means of literal, systematic and teleological interpretation and, where circumstances allow, in the light of their preparatory documents, reports on their drafting and their historical development.[20] Finally, the thesis also contemplates what kind of

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18 The need for formulating definitions of AI-assisted or AI-generated subject matter was mentioned for instance in World Intellectual Property Organization, 'Revised Issues Paper on Intellectual Property Policy and Artificial Intelligence' (*wipo,* May 2020) <https://www.wipo.int/meetings/en/doc_details.jsp?doc_id=499504> accessed 17 December 2021.

19 In the sense that Professor Burrows put forward: 'When we talk of "purpose", we are looking for the policy behind the statute or statutory provision.' Andrew Burrows, *Thinking About Statutes: Interpretation, Interaction, Improvement* (CUP 2018) 19.

20 The interpretation of international treaties is guided by Silke von Lewinski, *International Copyright Law and Policy* (OUP 2008) [6.0.4]–[6.0.8].

activity justifies granting patents and copyright subsistence by engaging with historical sources and justificatory theories.

While most of the scholarly literature deals with the implications of human-AI productions for copyright law separately from their implications for patent law, in the present thesis, these areas of law are addressed side by side. The reason is that, as advocated in this thesis, both these areas share the same core, ie they protect only subject matter that are human intellectual creations.

Although nowadays the notions of human intellectual creations and mental labour are associated with copyright rather than with patents, this has not always been the case. As researched by Professors Sherman and Bently, historically, the language of creativity was used in 'all areas of law which granted property rights in mental labour',[21] including patent law. According to them, the creativity underpinnings form a common ground and are shared by copyright and patent laws: 'the model of creativity employed by the law was not limited to literary property nor was it restricted to the late eighteenth century'.[22]

In essence, the questions of whether a particular subject matter constitutes a human-authored work or a human-devised invention, can be merged into a more general question of whether a subject matter constitutes a human intellectual creation in any of the fields of literature, art and technology. Adopting the prism of mental labour is also useful for advancing the argument that copyright and patents should remain reserved for human intellectual creations due to the special intrinsic and social value of human intellectual creations (Chapter VIII.).

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21 Brad Sherman and Lionel Bently, *The Making of Modern Intellectual Property Law: The British Experience, 1760-1911* (CUP 1999) 44.

22 ibid.

Besides the copyright protection of human intellectual creations, there are subfields of copyright, namely related or neighbouring rights, which are concerned with awarding copyright for entrepreneurial works such as sound recordings, films, broadcasting, typographical arrangements of published editions[23] and press publications.[24] The entrepreneurial works and neighbouring rights in them need to be addressed here at least to the extent that explains why this thesis does not deal with them in depth.

First of all, in contrast with authorial works being understood as products of human intellectual and creative choice and skill, entrepreneurial works are, as put by Professor Bently and others, 'product[s] of technical and organizational skill' effectuated by corporations.[25] Hence, the nature of entrepreneurial works is fundamentally different from the nature of authorial works.

Further, while copyright in authorial works is designed to reward and incentivise individual creativity and mental labour (more in Chapter VIII.), the neighbouring rights came to existence as a response to a contemporary need to protect investment in technology, ie 'investment in recording studios, technicians, mastering, record manufacturing and distribution'.[26] This makes the rationale for protection of entrepreneurial works fundamentally different from the rationale copyright in authorial works.

Admittedly, copyright in entrepreneurial works can pragmatically be utilised to cover authorless literary or artistic works. Copyright will arguably subsist in a sound recording of music composed entirely by an AI-driven system as well as in a (non-original) film

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23 All in Copyright, Designs and Patents Act 1988 ('CDPA'), s 1(1)(b), (c).

24 Directive 2019/790 of 17 April 2019 on copyright and related rights in the Digital Single Market and amending Directives 96/9/EC and 2001/29/EC [2019] OJ L 130/92, Art 15 relevant for the EU Member States (Germany and France in this thesis).

25 Lionel Bently and others, *Intellectual Property Law* (5th edn, OUP 2018) 36.

26 Bernt Hugenlholtz, 'Neighbouring Rights are Obsolete' (2019) 50 IIC 1006, 1007.

consisting of moving images entirely created by an AI-driven system. With that comes a corresponding scope of protection though.[27]

This thesis does not analyse neighbouring rights because its focus is on the principles of human authorship, their reflections in copyright subsistence criteria and their potential extension to human-AI productions which principles are missing in relation to entrepreneurial works under any circumstances. On a more general level, since this thesis is concerned with human intellectual creations and this is the main methodological discriminator of what is relevant to discuss, then, under such a prism, and perhaps paradoxically, an authorial work shares more in common with an invention than with an entrepreneurial work.

This thesis does not ignore the neighbouring rights completely. An analogy between the historical need to protect investment in recording equipment and distribution networks and a need to protect investment in development of AI-driven systems can be drawn.[28] Whether such an analogy would be a valid reason for protection is touched upon in Chapter V. discussing copyright for computer-generated works in the UK and Chapter VIII. disputing existence of the need to protect investment in AI-driven systems.

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[27] See ibid, 1011. There should always be a room for the allowed cases of copying the content without copying the signal which builds on Richard Arnold's distinction: 'It will be appreciated that copying the signal necessarily involves copying the content, but copying the content does not necessarily involve copying the signal.' Richard Arnold, 'Content Copyrights and Signal Copyrights: The Case for a Rational Scheme of Protection' (2011) 1 Queen Mary J Intell Prop 272, 272. Hence, a musical composition created by an AI-driven system may be freely re-created and adapted for performance or images created by an AI-driven system may be freely re-created and presented in the form of a painting provided no part of the sound recording itself or the (non-original) film itself is taken (or taken by means of a photograph in case of the film). CDPA, s 17 interpreted in the light of the Directive 2001/29/EC of 22 May 2001 on the harmonisation of certain aspects of copyright and related rights in the information society [2001] OJ L 167/10, art 2(c) nad (d) and C-476/17 *Pelham GmbH and Others v Ralf Hütter and Florian Schneider-Esleben* [2019] EU:C:2019:624, ruling 1. The making of an adaptation of sounds from a sound recording or moving images from a (non-original) film is allowed because only '[t]he making of an adaptation of the work is an act restricted by the copyright in a literary, dramatic or musical work.' CDPA, s 21(1).

[28] As done for instance by Martin Senftleben and Laurens Buijtelaar, 'Robot creativity: an incentive-based neighbouring rights approach' (2020) 42 EIPR 797, 808.

Lastly, national copyright regimes may contain exceptions to the general rule that literary and artistic works need natural persons as their creators. For instance, since the end of the nineteenth century journals, encyclopaedias and dictionaries (later referred to as collective works) have received a special treatment in France. A juridical person can originally be entitled to enjoy author's rights in these collective works because of its assumed ability to conceive the project of creating a collective work and take an active part in its composition and editing.[29] It is the decision to embark on creating a collective work that is made at the beginning of the process of creation which is regarded as crucial and thus makes the juridical person merit the initial entitlement to the result.[30] However, such exceptions ad hoc arising out of temporary, specific needs of certain markets or industries do not impact on the principled need for human authorship in works of literature and art on which this thesis focuses.

As its title suggests, this thesis is devoted to human intellectual creations in European patent and copyright (author's rights) laws. Hence, the doctrinal, conceptual and normative parts of research are conducted in European patent law, EU copyright law and national patent and copyright (author's rights) laws of the United Kingdom, France and Germany. These jurisdictions were selected because they emerge from different legal traditions while adhering to the harmonised EU copyright subsistence requirements and identical patentability requirements enshrined in the European Patent Convention.

The main idea is that shared standards and norms, besides their 'autonomous' life at the European level, are (supposed to be) transposed to national laws where they, in turn, interact with national traditional conceptions and requirements until they find a final form in the national authorities' application practices. This choice of jurisdictions thus promises

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29 André Bertrand, *Droit d'auteur* (3rd edn, Dalloz Action 2010) 204–05.

30 ibid.

an analysis of a wider spectrum of application practices and epistemic approaches which, at the same time, stem from the same legal bases. While this thesis is not primarily comparative, at exceptional instances, it was impossible to resist the temptation and not to compare, eg in case of the scope of copyright protection and its implications.

The choice of the United Kingdom, France and Germany was motivated by pragmatic reasons too. The first one is author's language skills. The second one is the anticipation that this thesis can be tested in real life in the not-too-distant future. This is because these countries aspire to be the leaders in AI in Europe and given their developed economies, skilled human capital and state funding poured into research,[31] they seem to be on their way to achieve it. Hence, the human-AI productions are expected to emerge in higher numbers in these countries and, at least in the first phase, be tried before British, French and German national authorities.

This thesis was submitted on 10 February 2022 and reflects the law in force and literature available until the closure of writing, ie 31 December 2021. Minor corrections to certain parts of the thesis were made in November 2022.

5 STRUCTURE AND CONTENTS

In overview, this thesis contains introduction, Chapter II. on the state of the art in AI and the ensuing questions, Chapter III. on inventorship in European patent law, Chapter IV. on inventorship in the application practice in the selected jurisdictions, Chapter V. on authorship in the selected jurisdictions, Chapter VI. on authorship at the EU level, Chapter

[31] Sam Shead, 'Britain, France and Germany fight it out to be Europe's AI leader' (*Forbes*, 26 April 2018) <https://www.forbes.com/sites/samshead/2018/04/26/britain-france-and-germany-fight-it-out-to-be-europes-ai-leader/> accessed 31 December 2021.

VII. on authorship in the application practice in the selected jurisdictions and a concluding chapter.

At a more granular level, the thesis proceeds as follows: Chapter II. introduces the developments in AI, the two most promising AI techniques and two capabilities of the state-of-the-art AI-driven systems which have tabled the novel problem and led to the AI and IP debate. The common issues of the AI and IP debate are also discussed in Chapter II., together with currently available answers to some of them. Chapter II. also offers a literature review and explains how this thesis relates to the AI and IP debate and how it aims to make a contribution.

Chapter III. tackles human inventorship in European patent law by investigating the UK, French and German conceptions of inventorship. It also brings answers as to whether the origin of an invention matters for granting a European patent under the European Patent Convention and whether the requirements for an invention and inventive step somehow reflect the human aspects of creation. Chapter IV. analyses reflections of human inventorship in the national patentability requirements and national authorities' treatment of these requirements. Here, the central problem of this thesis is addressed: do the authorities possess adequate epistemic approaches and methods to distinguish a human-devised invention from other subject matter?

Chapter V. looks at the conceptions of human authorship in the UK, French and German copyright laws. In contrast with patent law, the starting position is better because the scholarly literature offers more elaborate accounts of authorship on which this thesis can build. This allows Chapter V. to dig deeper into the relationship between human creators and their works to distil its essence. Chapter VI. offers an original view on construction of EU authorship from the available legislation and case law of the European Court of Justice. Chapter VII. is a copyright law counterpart of Chapter IV. and thus

analyses reflections of human authorship in the national copyright subsistence requirements and national authorities' treatment of these requirements. It also answers the central question: do the authorities employ such epistemic approaches and methods that enable them to distinguish a human-authored work from other subject matter?

Chapter VIII. concludes and recommends certain legal reforms. It also looks forward, takes the results of the present research and uses them to address the issues of the AI and IP debate. Chapter VIII. outlines the historical and theoretical reasons for upholding the status quo and preserving copyright and patents for human intellectual creations.

CHAPTER II.
STATE OF THE ART IN AI AND ENSUING QUESTIONS

1 INTRODUCTION

The present chapter introduces artificial intelligence (AI) as a field of human activity, its ambitions and the current state of the art from the perspective of people who work in it. This brief introduction to the 'AI magic' serves to establish the technical ground and demonstrate this thesis' relevance. Two capabilities of the current cutting-edge AI-driven systems are highlighted for their relevance and analysed in more detail. The first capability is producing outputs that are prima facie indistinguishable from human-authored works and human-devised inventions. The second one is to determine expressive elements and inventive technical features of their outputs. The technical side of AI is discussed only to the extent to which it enables appreciating certain thorny terminological issues and defining the AI-driven systems in which this thesis is interested. However, the technical aspects are separate from the legal analysis which follows in the next chapters.

This chapter then introduces the AI and IP debate, outlines issues that have attracted most attention so far. Against the background provided by the AI and IP debate, the chapter aims to position the main contribution of this thesis—an original inquiry into the authorities' epistemic approaches—and state its significance for the AI and IP debate.

This chapter proceeds as follows. First, it introduces the field of AI and two most promising AI techniques, ie machine learning and neural networks. Then, it presents the evidence of prima facie indistinguishability of human-made works and inventions and human-AI productions. It also offers expert accounts of the limits of human understanding of and control over the processes of AI-driven creation and invention. Finally, it outlines

issues of the AI and IP debate, how these issues have been tackled so far and how this thesis relates and contributes to the AI and IP debate.

2 WHAT IS ARTIFICIAL INTELLIGENCE?

The field of AI is deemed to have been established in a summer school organised by mathematicians and (early) computer scientists in Darthmouth College in New Hampshire in 1956.[1] It stems from the fields of mathematics, logic and computer science. It also experienced stages at which its advancements were propelled by probability theories, statistics, economics and neuroscience. [2]

Despite having written a few decades of its own history, no universally accepted definition of AI itself has been formulated to date. Neither its goals have been unanimously settled.[3] Professors Russell and Norvig in their textbook of AI summarise that most definitions of AI are concerned either with thought processes and reasoning implying that the goal of AI designers is to design machines that think like humans, or with behaviour aiming at machines that perform tasks that normally require intelligence when performed by humans.[4] In more specific terms, as put by Professors Wooldridge and Russell at different occasions, '[w]e build agents and delegate our preferences to them; these agents

1 Michael Wooldridge, *The Road to Conscious Machines. The Story of AI* (Penguin 2020) 50. Michael Wooldridge is a Professor of Computer Science at the University of Oxford working in the field of AI for several decades.

2 Wooldridge (n 1) 165.

3 Wooldridge (n 1) 2.

4 Stuart Russell and Peter Norvig, *Artificial intelligence: a modern approach* (3rd global edn, Pearson 2016) 1-2.

act rationally on our behalf to carry them out, using rational decision-making as exemplified by von Neumann and Morgenstern's expected utility theory […]'.[5]

Predictions as to when machines will achieve a human-level intelligence (in terms of thinking or acting) or even outperform it capture the imaginations not only of laypeople.[6] In 2014, world-leading physicists and computer scientists Hawking, Tegmark and Russell asserted that

> [t]here are no fundamental limits to what can be achieved: there is no physical law precluding particles from being organized in ways that perform even more advanced computations than the arrangements of particles in human brains. An explosive transition is possible, although it may play out differently than in the movie: as Irving Good realized in 1965, machines with superhuman intelligence could repeatedly improve their design even further, triggering what Vernor Vinge called a "singularity".[7]

To put these two pieces of information together, the ambitions in AI are high and apparently with no physical law standing in their way. Tests for measuring whether an AI-driven system achieves human-level thinking or acting have already been proposed. The well-known example is the Turing test which looks at predictability of outputs:

> [t]he extent to which we regard something as behaving in an intelligent manner is determined as much by our own state of mind and training as by the properties of the object under consideration. If we are able to explain and predict its behaviour or if there seems to be little underlying plan, we have little temptation to imagine intelligence.[8]

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5 Wooldridge (n 1) 162. The same (modern) definition of AI was offered by Stuart Russell 'BBC Reith Lectures 2021 – Living with Artificial Intelligence. Transcript of the Lecture' 5 (BBC 1 December 2021) <https://www.bbc.co.uk/programmes/m001216j> accessed 12 December 2021.

6 Oren Etzioni, 'No, the Experts Don't Think Superintelligent AI is a Threat to Humanity' (*MIT Technology Review*, 20 September 2016) <https://www.technologyreview.com/s/602410/no-the-experts-dont-think-superintelligent-ai-is-a-threat-to-humanity/?utm_campaign=internal&utm_medium=homepage&utm_source=top-stories_3&set=602438> accessed 22 December 2021.

7 Stephen Hawking, Max Tegmark and Stuart Russell, 'Transcending Complacency on Superintelligent Machines' (*Huffpost*, 19 April 2014) <https://www.huffingtonpost.com/stephen-hawking/artificial-intelligence_b_5174265.html?guccounter=1> accessed 22 December 2021.

8 Alan Turing, Richard Braithwaite, Geoffrey Jefferson, and Max Newman, 'Can Automatic Calculating Machines be Said to Think?' (1952) in Jack Copeland (ed), *The Essential Turing* (OUP 2004) 491.

It follows that a Turing-like test would contain a set of criteria or questions which interrogators ask to uncover a rules-based thinking on the other side. If the human interrogators can discover a purely rules-based, predictable thinking behind the responses given in the course of testing, they are unlikely to believe in having a conversation with a fellow human.[9] However, the extent to which the interrogators regard something as behaving in an intelligent manner is determined as much by their own state of mind and training as by the properties of the object under consideration.

Alternatively, the Lovelace test proposed by Professor du Sautoy examines whether the creative process undertaken by a machine is 'repeatable [...] and yet the programmer is unable to explain how the algorithm produced its output'.[10] This would mean that a machine is able to add something more to the inputs in the process of creation of the output which did not occur accidentally. Though this test eliminates the possibility of human interrogators projecting intelligence into the machine, it relies on honesty of the designers' pledge that they are unable to explain how the output was produced.

Leaving the world of aspiration, even enthusiasts do not assert that (human-level) artificial general intelligence or superhuman intelligence would be a reality of today. The present AI-driven systems struggle in adversarial environments or when facing unexpected situations, eg a self-driving car suddenly encountering a pedestrian.[11] In addition to poor adaptability, inserting informal knowledge to computers remains one of the key challenges of AI.[12]

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9 Diane Proudfoot and Jack Copeland, *The Oxford Handbook of Philosophy of Cognitive Science* (OUP 2012) 4.

10 Marcus du Sautoy, *The Creativity Code: How AI is Learning to Write, Paint and Think* (4th Estate 2019) para 6.29.

11 Sam Levin, 'Uber crash shows "catastrophic failure" of self-driving technology, experts say' (*Guardian,* 22 March 2018) <https://www.theguardian.com/technology/2018/mar/22/self-driving-car-uber-death-woman-failure-fatal-crash-arizona> accessed 22 December 2021.

12 Ian Goodfellow, Youshua Bengio and Aaron Courville, *Deep learning* (MIT Press 2016) 2.

Despite (not yet) encountering machines which would do well in general affairs, there is evidence of the current state-of-the-art AI-driven systems performing amazingly at narrowly specified tasks that are to be executed in a customised, friendly environment.[13] In more concrete terms, there are two components of AI which enabled these recent achievements and deserve a closer look: machine-learning and neural networks.

2.1 Machine-Learning

Machine learning is a sub-field of AI that deals with machines which 'compute a desired output from a given input, without being given an explicit recipe for how to do this.'[14] This contrasts with conventional computing where the 'recipe' for computation is given to the machine.

Machine learning algorithms can mine data, discover a function from them and then use it to solve prediction problems in future situations (inductive learning).[15] The training of a machine learning algorithm (MLA) involves statistical analysis, including inductive logic, applications of probability theories which enable decision-making under uncertainty and providing feedback. Human designer's choices of parameters for training an MLA such as a training dataset, probability theory, probability distribution and type of feedback, are interrelated and largely depend on the task that the MLA should perform.[16] These choices determine the type of learning and naturally have a significant impact on the nature of outputs generated by the MLA.

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13 For examples see Wooldridge (n 1) 220–21.

14 Wooldridge (n 1) 169.

15 Clarence Chio and David Freeman, *Machine learning and security: protecting systems with data and algorithms* (O'Reilly 2018) 9-10. Russell and Norvig (n 4) 693.

16 This builds on author's own experience acquired in the Machine Learning course at the CDT in Cyber Security, Computer Science Department, University of Oxford.

There are three basic types of machine learning. Under supervised learning, an MLA is fed with training data that has been labelled by a designer or there may be human feedback provided in the process of learning. The MLA is given hypotheses which it tests against the authorised input-output pairs in order to find the underlying function between the input and the output.[17] In this case, the human designer is in control of choosing a reliable training dataset, the key features (attributes) in data and the starting hypothetical function. The role of the MLA is to perform function approximation and make predictions for novel (never seen) data.[18]

Under unsupervised learning, the MLA is tasked to search for patterns on its own, usually by means of clustering, ie allocating data to clusters.[19] This means that the MLA is left to learn just on output data, without any feedback or training dataset, designated attributes or starting hypothetical function. Therefore, it is not as influenced by the biases in labelled data or by the assumptions made by human designers as it would have been under the supervised learning. Nonetheless, for instance in clustering, human designers must supply the MLA with some context to enable it to plot the data, ie estimate the distribution over the number of clusters and estimate which cluster each point belongs to.[20] Additionally, human designers must choose and apply a probabilistic model to make sense of the data plot (the output).

Finally, the third type of machine learning, reinforced learning is used in behaviour training and the feedback consists of giving reward and punishment signals upon action

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17 Russell and Norvig (n 4) 695.

18 Kevin Murphy, *Machine learning: a probabilistic perspective* (MIT Press 2012) 3.

19 Russell and Norvig (n 4) 694.

20 Murphy (n 18) 10–11.

driven by the MLA.[21] Here, the human interference with the MLA training is reduced to ex post evaluation of its performance. Typically, this happens at the end of a training game when the MLA is just announced whether it lost or won and hence it learns from its previous mistakes – 'it can use this information to learn an evaluation function that gives reasonably accurate estimates of the probability of winning from any given position.'[22]

It follows that the types of learning offer various degrees of human designers' control over the form of outputs in the training phase as well as after the outputs are generated. While the supervised learning is encumbered with bias in labelled data and assumptions made at its beginning, the interpretation of outputs is rather straightforward. Conversely, the unsupervised learning is free from bias in the training dataset and other initial assumptions, yet somewhat constrained by choice of probabilistic models to interpret the final outputs. The reinforced learning, in effect, imitates learning of animals or children and when coupled with neural networks structure it yields impressive results, but its workings remain in obscurity (see in more detail below).

2.2 Neural Networks

One of the most promising machine learning techniques are neural networks. The idea of neural networks originated in the field of psychology. It dates to 1958 when Rosenblatt published his work on the perceptron—a probabilistic model for information storage and organisation in the brain.[23] Nowadays, neural networks experience a revival thanks to some non-methodological developments, such as accessibility of vast amounts of data and

21 ibid 10.

22 Russell and Norvig (n 4) 831.

23 Frank Rosenblatt, *The perceptron: a theory of statistical separability in cognitive systems (Project Para)* (Cornell Aeronautical Laboratory 1958).

availability of efficient computing hardware, eg graphics processing units,[24] and one important methodological step. The methodological game changer rests in implementation of more layers of networks with different structure and different roles in the whole network.[25] Thereby the networks became deep neural networks.

Neural networks are composed of interconnected nodes (artificial neurons) which carry a mathematical model.[26] These nodes receive and process inputs from their neighbouring nodes and generate an output if activated. Their activation depends on (i) a weighted sum of all incoming inputs, (ii) a so-called activation function and (iii) an activation threshold.[27] Advanced neural networks also incorporate a so-called backpropagation function which enables the network to send feedback backwards (to the nodes in the previous level) and compute gradients of error and then optimise the weights accordingly.[28] Initially, the weights and activation thresholds can be set to random values and they adjust continually during the training.[29] Given these characteristics, namely the lack of precise instructions for computation and the continual adjusting of weights and activation thresholds on their own, neural networks are in some sense. The autonomy is present in decision-making and to some extent in the training in the sense that human designers do not supervise or interfere with the training (reinforced learning) or interfere minimally (unsupervised learning).

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24 Alice Roberts and Michael Wooldridge, *Artificial Intelligence* (Penguin Books 2018) 40.

25 Matt Taddy, 'The Technological Elements of Artificial Intelligence' (*NBER* February 2018) <https://www.nber.org/papers/w24301.pdf> accessed 22 December 2021.

26 Russell and Norvig (n 4) 729.

27 Wei Di, Anurag Bhardwaj, Wei, Jianing, *Deep Learning Essentials: Your hands-on guide to the fundamentals of deep learning and neural network modeling* (Packt Publishing 2018) 83.

28 ibid 87.

29 Larry Hardesty, 'Explained: Neural Networks' (*MIT News* 14 April 2017) <https://news.mit.edu/2017/explained-neural-networks-deep-learning-0414> accessed 22 December 2021.

3 ASPECTS OF AI RELEVANT FOR INTELLECTUAL PROPERTY

The key message from the above is that there is a variety of AI techniques with various properties.[30] These properties, their settings and architectures (for neural networks) represent a trade-off between exploiting the full potential of AI-driven systems and interpretability of their outputs. The less controlled the AI-driven systems the more questionable the responsibility for the outputs and attribution of the outputs to the people behind those systems. This thesis defines the AI-driven systems of its interest as AI-driven systems that (i) can produce outputs indistinguishable from those made by human beings and (ii) can determine expressive elements and inventive technical features of their outputs autonomously (ie without relevant human intervention or understanding).

3.1 Prima Facie Indistinguishability of Outputs

To make this more concrete, some real-life examples are used to demonstrate how expressive and technical human-AI productions look and feel like and how they come to being. To begin with a notorious example of painting imitating Rembrandt's style—an AI-driven system was let to collect and process data from Rembrandt's paintings, and, on their basis, it was commissioned to generate a portrait of a Caucasian man of a certain age, with certain appearance features and facing to the right.[31] Allegedly, to a layman, even a Rembrandt fan, the painting would look authentic, as if it were Rembrandt's own.[32]

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30 And many more are described in Russell and Norvig (n 4).

31 ING, Video on making the Next Rembrandt (*Next Rembrandt*, undated) <https://www.nextrembrandt.com/> accessed 22 December 2021.

32 Martin Veitich, 'The story behind Rembrandt's last, 3D-printed masterpiece' (*IDG Connect*, 8 June 2016) <https://www.idgconnect.com/article/3579984/the-story-behind-rembrandt-s-last-3d-printed-masterpiece.html> accessed 22 December 2021.

Although, as admitted by those behind The Next Rembrandt project, the resulting painting would not confuse experts.[33]

Another group of researchers focused on designing an AI-driven system to generate sonnets. The resulting sonnets, as far as stress and rhyme were concerned, were evaluated as 'indistinguishable from human-written poems'.[34] On the whole, they were evaluated 'as nearly indistinguishable from published poems by humans'[35], whereas experts found them to 'lack readability and emotion'.[36]

Further, audiences at the Camden and Edinburgh Fringe theatrical festivals struggled to detect with certainty whether a particular improvisational scene they watched was performed by a human behind a robot or by an AI-driven robot. This was allegedly due to the immediate and contextual responses produced by the AI-driven robot.[37] As the designers of the AI-driven robot claim, 'approximately half the audience members believed that an AI was performing flawlessly alongside human improvisor(s)'.[38]

Anyone may experience the goosebumps given by a tour of pixels arranged by an AI-driven system in such a manner that one would think they are looking at digital photographs

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33 ibid. Another thing is the likelihood of confusion as to the origin of the physical carrier. The Next Rembrandt painting came out of a 3D printer so it could hardly be confused with a centuries-old oil on canvas. Nevertheless, in contrast to a painting, for a work which is originally digital, such as a digital photograph or a piece of software, it could be extremely difficult to tell the origin only on the basis of experience with the object.

34 Jey Han Lau and others, 'Deep-speare: A joint neural model of poetic language, meter and rhyme' Proceedings of the 56th Annual Meeting of the Association for Computational Linguistics (*arXiv*, 10 July 2018) <https://arxiv.org/abs/1807.03491> accessed 22 December 2021.

35 ibid 1.

36 ibid.

37 Kory Mathewson and Piotr Mirowski, 'Improvised Comedy as a Turing Test, 31st Conference on Neural Information Processing Systems' Workshop on Machine Learning for Creativity and Design (*arXiv* 23 November 2017) <https://arxiv.org/abs/1711.08819> accessed 22 December 2021.

38 ibid.

of real persons' faces.[39] In reality, these pictures are generated by a generative adversarial network.[40] It is open to anyone to make their own conclusion on the indistinguishability of those doctored pictures and digital portraits of real people made by human beings.

In the domain of patent law, only a couple of people suggest that AI-driven systems can produce technical solutions indistinguishable from human-made ones. Professor Abbott writes that an AI-driven system modelled after biological evolution processes produced technical solutions that were granted patents in the US.[41] The following patent claim lists an invention allegedly invented by an AI-driven system:

> A neural network based prototyping system for prototyping construction of a device from a plurality of known components, wherein a desired relationship between inputs and outputs of the device being prototyped is known, comprising: [...].[42]

This claim does not differ to an appreciable extent from the following (comparable) inventive concept which was devised by human inventors: 'A computer implemented process for training neural networks to their optimal training point, the process comprising the steps of: initializing neural network node weight values [...].'[43]

Another patent claim describing allegedly another technical solution produced by an AI-driven system without a human inventor:

> A food or beverage container comprising: a wall defining an internal chamber of the container, the wall having interior and exterior surfaces and being of substantially uniform thickness; wherein the wall has a fractal profile with corresponding convex and concave fractal elements on corresponding ones of the

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39 Terro Karras and others, 'Nvidia Original GAN StyleGAN' (*This person does not exist*, December 2018) <https://thispersondoesnotexist.com/> accessed 13 December 2021. Click on the link and keep clicking the refresh button, faces of people who do not exist will appear.

40 ibid.

41 Ryan Abbott, 'I Think, Therefore I Invent: Creative Computers and the Future of Patent Law' (2016) 57 BC L Rev 1079, 1086.

42 Neural network based prototyping system and method, US patent 5852815A expired <https://patents.google.com/patent/US5852815A/en> accessed 22 December 2021. Claimed by Stephen Thaler as presented in Abbott (n 41) 1085.

43 Optimum cessation of training in neural networks, US patent 6119112A <https://patents.google.com/patent/US6119112A/en?q=Neural+network&q=based&assignee=International+Business+Machines+Corporation> accessed 22 December 2021.

> interior and exterior surfaces; and wherein the convex and concave fractal elements form pits and bulges in the profile of the wall.[44]

The patent application containing the claim above cited a piece of prior art—a seamless can—invented by a team of inventors from Japan:

> A shock resistant seamless can comprising a side wall having an inside surface and an outside surface formed from a laminate of a metal substrate and a thermoplastic resin layer provided on the inside surface of the can side wall, wherein the inner surface of the side wall resin layer opposite the metal substrate comprises a plurality of dotted projections.[45]

Apparently, presentation of the inventive concept in the form of a patent claim makes the claimed technical solution (allegedly) lacking a human inventor indistinguishable from the technical solutions made by human beings.

For more examples of human-AI productions indistinguishable from human-made objects this chapter refers to the wealth of literature on the topic.[46] It is hoped that the examples supplied here are sufficient to give a flavour of the achievements of some AI-driven systems. As the human audiences (whose testimonies were referred to above) evaluated by their own senses, the human-AI productions they have encountered were so expressive or technical that they found them were prima facie indistinguishable from human-authored works or human-devised inventions. Recalling the Turing test, it is plausible that some of the above-listed outputs would pass the test in natural conditions, eg at the Camden and Edinburgh Fringe festivals.

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[44] Food container, European patent application EP3564144A1 <https://worldwide.espacenet.com/patent/search/family/063915228/publication/EP3564144A1?q=pn%3DEP3564144> accessed 13 December 2021.

[45] Seamless can, US patent US5803301A, Decision of the US PTO of 8 September 1998 <https://worldwide.espacenet.com/patent/search/family/063915228/publication/EP3564144A1?q=pn%3DEP3564144> accessed 13 December 2021.

[46] Patrick Goold, 'Artificial Authors: Case Studies of Copyright in Works of Machine Learning' (2020) 67 J Copyright Soc'y USA 427, Ben Hattenbach and Joshua Glucoft, 'Patents in an Era of Infinite Monkeys and Artificial Intelligence' (2015) 19 Stan Tech L Rev 32. Christian Hartmann, Jacqueline Allan, Bernt Hugenholtz and others, 'Trends and Developments in Artificial Intelligence Challenges to the Intellectual Property Rights Framework' (*invir,* 2020) <https://www.ivir.nl/ivir-study-for-european-commission-on-ai-and-ip/> accessed 13 December 2021.

3.2 AI-Driven Systems that Can Determine Expressive and Technical Elements of their Outputs

The second aspect of some AI-driven systems that makes them relevant for intellectual property law is that they can autonomously determine expressive and technical elements of their outputs. The difficulty with this claim is that it can be either verified by examining the process of creation or accepted bona fide in statements of the people behind the AI-driven systems. Since for the moment there is no obligation to submit to such an examination nor are there any specific methods for such an examination in place, the thesis proceeds to rely on the veracity of the expert statements.[47]

For instance, such a human-free determination of expressive elements probably happened in the case of the Next Rembrandt project. The designers had openly admitted the nature of choices and the origin of the expressive elements.[48] To reiterate, they instructed the systems to design a portrait of a Caucasian man of age between thirty and forty, with facial hair, in contemporary clothing and facing to the right. As follows from the designers' testimonies, this choice was driven by data availability and other effectiveness considerations.[49] The AI-driven system then generated the portrait on the basis of data gathered under the chosen subject's profile. Hence, the expressive elements of the portrait such as the colours, shapes, light, shades, etc, and their arrangement were determined by the evaluative process within the AI-driven system and the input data. It seems that no human being was directly and immediately involved in the process of making decisions about the visually expressive details of the resulting painting.

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47 The risks of bias or dishonesty in the statements are mitigated by checking them against expert sources – professors of computer science with years of experience in the field of AI, namely Professors Wooldridge and Russell, with no apparent overriding stakes in the debate.

48 ING (n 31).

49 ING (n 31) 1'44''.

Another example may be AI-driven systems producing technical solutions in the DARPA 2016 Cyber Grand Challenge, 'the world's first all-machine cyber hacking tournament'.[50] The competing AI-driven systems were able to find flaws in their own systems, reason about them, patch them and look for flows in the competing systems and attack them, all in real time and autonomously, ie without any human inputs in the course of the contest. Under such circumstances, the resulting technical elements of the solutions towards patching and attacking were directly and immediately determined by the systems.

Lastly, drug discovery appears to be the promised land for application of AI-driven systems to technical problems. In 2020, an AI-driven system identified a highly effective antibiotic—with a given name *halicin*.[51] According to the scientists supervising the process of invention, the system learnt representations of molecules 'automatically, mapp[ed] molecules into continuous vectors […and designed…] molecular representations that are highly attuned to the desired property'.[52] They further described the approach of the system as analytical, using abstracted information about molecular representation inscrutable and unavailable to human beings. This change of method allowed identifying structurally different antibiotics.[53]

From this example, it follows that the system was given a task to find a compound with a desired property in relation to *E.coli,* ie the technical problem was presented to the system. The system was then let to crawl chemical libraries and ranked *halicin* very high with respect to the desired property, ie it found the technical solution. Ranking *halicin* high

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50 Dustin Fraze, 'Cyber Grand Challenge (CGC) (Archived)' (*U.S. Department of Defense*, undated) <https://www.darpa.mil/program/cyber-grand-challenge> accessed 22 December 2021.

51 Jonathan Stokes and others, 'A Deep Learning Approach to Antibiotic Discovery' [2020] Cell 688, 689.

52 ibid.

53 ibid.

was a result that no human being involved in the process was able to control or have prior knowledge of.

If the processes run on the above-mentioned AI-driven systems are repeatable and at the same time it is true that there is no way in which it can be explained how the outputs are produced, those AI-driven systems would pass the Lovelace test. These achievements and processes are difficult to translate into the language of social science and humanities. Legal scholars especially disagree on whether AI-driven systems are a mere tool, or they come up with their outputs autonomously.

Law Professor Blok, for instance, writes that 'artificial intelligence did not take the initiative to invent. It was used by humans as a tool in the inventive process. In that sense, artificial intelligence does not invent autonomously.'[54] Or, researcher in law, Kim, writes that 'it is doubtful whether computers can, at all, be autonomous from humans and perform computation "on their own".'[55] In the view presented here, handling these arguments requires the utmost sensitivity to the context. In some contexts, they may be right.

Undoubtedly, there are AI-driven systems with no level of autonomy. These are, however, not a subject of interest in this thesis as they cause no novel problems for copyright and patent laws. The various applications of MLAs in the cyber security domain may serve as examples. When focussing on illegitimate activities, a supervised pattern recognition may be used for MLA training in detecting spams in the incoming email on the basis of the observed predictable attributes of a spam, eg containing words 'lottery', 'cheap', 'offer', etc.[56] Alternatively, an MLA based on Bayesian inferential statistics which

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54 Peter Blok, 'The inventor's new tool: artificial intelligence - how does it fit in the European patent system?' (2017) 39 EIPR 69,70.

55 Daria Kim, '"AI-Generated Inventions": Time to Get the Record Straight?' (2020) 69 GRUR International 443, 446.

56 Chio and Freeman (n 15) 13.

can extract patterns from larger amounts of information without being distracted by noise may be used in intrusion detection systems.[57] In these settings, the systems indeed amount to mere tools.

Another context is the higher-order realm. When discussing motivation (taking the initiative to invent or create) or intentionality (setting out the high-order objective, eg find an antibiotic), indeed AI-driven systems may plausibly be regarded as a mere tool. Equally, it is true that the AI-driven systems (which are of this thesis' interest) are not autonomous in the sense that they would go about their own business. However, as shown on the examples above, these systems are sufficiently autonomous to find a way to solve a complex, narrowly specified technical problem on their own.

In contrast with the legal scholars mentioned above, when Professor Wooldridge describes current AI-driven systems, he does not shy away from using the term of autonomy. For instance, he comments on the achievements of a Deep Mind's AI-driven system as follows: 'it learned how to play [the game of Go] to a super-human level without any human supervision at all: it just played against itself.'[58] In relation to another system which learnt to cheat in a game in order to play more efficiently, he wrote: '[t]his was not anticipated by Deep Mind's engineers: it was autonomously learned by the program.'[59]

Moreover, from the perspective of people working in the field of AI, there is a crucial methodological difference between the 'autonomous' AI techniques and conventional computing (eg run on a laptop). As mentioned above, the AI-driven systems (of this thesis' interest) operate upon being given an abstract guidance and a definition of an objective

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57 Bazara Barry and Anthony Chan, 'Intrusion Detection Systems' in Peter Stavroulakis and Mark Stamp (eds), *Handbook of Information and Communication Security* (Springer 2010).

58 Wooldridge (n 1) 199.

59 Wooldridge (n 1) 195.

(imagine a magic goldfish or a genie from a lamp[60]) and do not require precise instructions for computation, ie the recipe.[61] There is a qualitative difference between performing under an abstract guidance and under precise, step-by-step instructions. It would thus be a stretch to call both—a laptop and a magic goldfish—tools of the same rank. Rather, a laptop may be called a tool that follows a recipe,[62] whereas a magic goldfish is a means to an end.

What can be inferred from these statements is that in the field of AI some concepts, such as autonomy or intelligence, may not mean the same thing as in the context of social sciences and humanities.[63] In the view presented here, the term autonomy in the context of AI seems to mean freedom from human control when making choices rather than autonomy in the Kantian sense of exercising autonomous free will when making decisions[64] (Put differently, autonomy is more likely to mean 'freedom from' than 'freedom to' as coined

60 Metaphors of this kind are used by Wooldridge (n 1) 261 and Russell (n 5) 10 as well. They do not intend to create an allure of fancy or mystery but rather communicate the level of abstraction of the instructions given to a machine and the absence of clear instructions how to achieve the goal.

61 Wooldridge (n 1) 169.

62 To indulge in some pedantry, even a laptop is far from a common meaning of a tool in ordinary language. According to Oxford English Dictionary, a tool means '[a]ny instrument of manual operation' (Johnson); a mechanical implement for working upon something, as by cutting, striking, rubbing, or other process, in any manual art or industry.' Oxford English Dictionary Online (*EOD*, December 2020) <https://www.oed.com/> accessed 31 December 2021. Hence using a laptop as a tool would mean using only the hardware as a lever or hammer for instance.

63 Some legal scholars prefer referring to 'automation' instead of 'autonomy' in the context of AI, eg Kim (n 55). Other legal scholars refer to AI-driven systems as not only autonomous but also creative, unpredictable, independent, rational, evolving, eg Shlomit Yanisky Ravid and Xiaoqiong Liu, 'When Artificial Intelligence Systems Produce Inventions: An Alternative Model for Patent Law at the 3A Era' (2018) 39 Cardozo L Rev 2215. This confusion of terms causes appreciable misunderstandings among legal scholars commenting on the developments in AI.

64 Robert Johnson and Adam Cureton, 'Kant's Moral Philosophy' in Edward Zalta (ed), *The Stanford Encyclopedia of Philosophy* (*plato.stanford*, Spring 2021) <https://plato.stanford.edu/archives/spr2021/entries/kant-moral/> accessed 11 December 2021.

by Erich Fromm).[65] Equally, intelligence is more likely to mean rationality and advanced computation[66] than intelligence based on consciousness.[67]

This explanation is supported by the fact that although the Turing test and the Lovelace test aim at scrutinising intelligence and autonomy, passing neither of them requires consciousness or Kantian autonomy. For the purposes of the present thesis, it is also pertinent to mention that to grant intellectual property rights, laws do not, in principle, require human beings to be in the state of Kantian autonomy or consciousness when making a work or an invention.[68]

Finally, the recent advancements in AI brought certain opaqueness and inscrutability of AI-driven systems' inner workings which is significant for copyright and patent laws. There are sensory and intellectual observations of the inner workings of the AI-driven systems or, better say, a lack thereof. As put by Wooldridge, 'the intelligence they embody is opaque. The expertise that a neural network has captured is embodied in the numeric weights associated with the links between neurons, and, as yet, we have no way of getting at or interpreting this knowledge.'[69] According to other accounts, human designers also

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65 Erich Fromm, *Escape from Freedom* (first published Farrar & Rinehart 1941); Erich Fromm, *Strach ze svobody* (Portál 2014).

66 Hawking, Tegmark and Russell (n 7).

67 Some philosophers argue that it is not correct to describe AI-driven systems as intelligent because they do not have human consciousness. See talks given by Professors John Searle and Luciano Floridi at the conference 'Technology and the Human Future' (*youtube*, 25 October 2016) <https://www.youtube.com/watch?v=b6o_7HeowY8> accessed 6 September 2018.

68 Gernot Schulze, 'UrhG § 7 Urheber' in Thomas Dreier and Gernot Schulze (eds), *Urheberrechtsgesetz* (6th edn, CH Beck 2018) [3]. *Cummins v Bond* [1927] 1 Ch (EWHC Ch) 167, 168. André Bertrand, *Droit d'auteur* (3rd edn, Dalloz Action 2010) 140.

69 Wooldridge (n 1) 188.

struggle to track causality in the systems' decision-making processes and retrieve reasons for their concrete decisions.[70]

This carries important implications for assumptions of authorship and inventorship and application of copyright and patent laws. As the examples of the antibiotic discovery or making the à la Rembrandt painting illustrate, human beings who deploy AI-driven systems in the process of problem solving or emulating art may have neither the control over the concrete form of the final outputs nor the ability to grasp those outputs intellectually before they are completed.

4 ISSUES OF THE AI AND IP DEBATE IN THE SPOTLIGHT

There is more than one plausible way in which the issues related to the advancements in AI and challenging the copyright and patent laws can be phrased. Without making any taxonomic claims regarding how these issues should be formulated, they, nonetheless, must be somehow conceptually captured and separated so that they could be addressed by this thesis in a structured manner. Therefore, these issues are condensed into the following, interrelated questions (ie the issues of the AI and IP debate for short):

i. Does current law recognise an AI-driven system as an inventor or an author (and hence can an AI-driven system be named as the inventor in a patent application or designated as an author in the copyright context)?

ii. Can an AI-driven system (in fact) devise an invention or create works of literature or art?

[70] Will Knight, 'The Dark Secret at the Heart of AI' (*MIT Technology Review*, 11 April 2017) <https://www.technologyreview.com/s/604087/the-dark-secret-at-the-heart-of-ai/> accessed 22 December 2021.

iii. Should any changes to law be introduced in order to accommodate human-AI productions that lack a human author or inventor?

These questions or their slight variations entertain people in the industry using AI-driven systems to create forms of expression or technical solutions, judges who were lucky enough to have a case ostensibly involving an AI-driven system landed on their desks, regulators contemplating how to steer innovation and bureaucrats at copyright and patent offices facing a necessary adaptation of their practices.

So far, the courts have had a chance to express themselves to the question (i). The industry does not seem to have a united position on (ii) but likely would have a shared view on (iii).[71] Public policy makers across the world are gathering information and launching public consultations concerning mainly the issues (ii) and (iii).[72] The patent offices seem to have a clear view on (i)[73] and some of them are directing their efforts to (iii). And legal scholars are all over the place.

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71 The perspective of industry is not tackled in this thesis in any depth, but some insights can be drawn from industry contributions to public consultations, eg United States Patent and Trademark Office, 'Public Views on Artificial Intelligence and Intellectual Property Policy' (*USPTO*, 6 October 2020) <https://www.uspto.gov/about-us/news-updates/uspto-releases-report-artificial-intelligence-and-intellectual-property> accessed 17 December 2021.

72 ibid, World Intellectual Property Organization, 'Revised Issues Paper on Intellectual Property Policy and Artificial Intelligence' (*wipo*, May 2020) <https://www.wipo.int/meetings/en/doc_details.jsp?doc_id=499504> accessed 17 December 2021, UK IPO, 'Impact Assessment' (*gov*, 29 October 2021) <https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1029930/impact-assessment.pdf> accessed 16 December 2021, Japan Intellectual Property Strategy Headquarters, 'Intellectual Property Strategic Program 2016' (*kantei.go* May 2016) <https://www.kantei.go.jp/jp/singi/titeki2/kettei/chizaikeikaku20160509_e.pdf> accessed 17 December 2021.

73 See the journey of the DABUS patent applications discussed below and the footnote below.

4.1 Issues Raised Before Authorities

In the realm of patents, a semi-academic initiative was launched by Thaler, a creator and owner of an AI-driven system called DABUS, and law Professor Ryan Abbott who attempt to obtain a patent for technical solutions allegedly autonomously (ie without a human inventor) devised by DABUS.[74] As Lord Justice Arnold put it, it is 'a test case'.[75]

The questions raised by the DABUS patent applications were as to whether an AI-driven system can be designated as an inventor and how, if at all, the right to a patent can be transferred to the patent applicant, Thaler. Neither authority delved into the issue (ii), ie whether DABUS had actually invented anything. Rather, the authorities relied on the statements of the person behind DABUS, Thaler. A summary of material decisions on the DABUS patent applications from the UK, USA, Australia and the European Patent Office follows.[76]

In short, on 21 December 2021, the Legal Board of Appeal of the European Patent Office confirmed the decision made by the Receiving Section.[77] The confirmed decision refused the DABUS patent applications on the ground that they did not designate the

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74 European patent applications EP 18 275 163 and EP 18 275 174, UK patent applications GB1816909.4 and GB1818161.0, US patent applications Nos 16/524,350 and 16/524,532, patent application no. 2019363177 (a PCT application) all designating DABUS as the inventor (all together referred to as DABUS patent applications).

75 *Stephen Thaler v Comptroller General of Patents Trade Marks and Designs* [2021] EWCA Civ 1374, [2021] 9 WLUK 172 [114].

76 In July 2021, South Africa granted patents for technical solutions subject of the DABUS patent applications. But this decision is not regarded as material because in the South African patent system there is no substantive examination of the applications. See Chijioke Okorie, 'Artificial Intelligence system as inventor in South African patent application: The case of DABUS' (*ipkitten*, 16 August 2021) <https://ipkitten.blogspot.com/2021/08/artificial-intelligence-system-as.html> accessed 15 December 2021.

77 EPO, 'Press Communiqué on decisions J 8/20 and J 9/20 of the Legal Board of Appeal' (*EPO*, 21 December 2021) <https://www.epo.org/law-practice/case-law-appeals/communications/2021/20211221.html> accessed 22 December 2021.

inventor.[78] In addition, an auxiliary request was rejected—an indication of a natural person who had a right to a European patent by virtue of ownership and creation of DABUS, the AI-driven system, was held not sufficient.

It follows that under the European Patent Convention system, an AI-driven system cannot serve as a designated inventor in the patent grant proceedings before the European Patent Office, indication of a person who owns or creates an AI-driven system does not suffice to establish the entitlement to a European patent and the European Patent Office finds itself competent to decide that particular question of entitlement.

In effect, it means that the failure to designate a person with legal capacity as the inventor raises a formal obstacle to the substantive examination of the patent application and thus grant of a European patent.[79] Thereby, at least formally and implicitly, the European Patent Office requires that the invention the subject of a patent application is attributed to a person.

On 21 September 2021 the UK Court of Appeal affirmed the first instance judgment on the UK DABUS patent application.[80] It held that only a person can be an inventor and hence only a person can be named as the inventor in the patent application.[81] Two justices, Lady Justice Laing and Lord Justice Arnold, further agreed that there was no legal basis for a valid transfer of the right to a patent from a machine. More concretely, the patent applicant, Thaler, tried to argue that he is entitled to a patent on the basis of accession.[82] Lord Justice Arnold rejected this argument since there is no legal basis for vesting rights in

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78 EPO's reasoned decision of 27 January 2020 on patent applications EP 18 275 163 and on EP 18 275 174, appealed and appeal dismissed.

79 Examination of formalities precedes examination of substantive requirements. EPC, Articles 78 and 90.

80 *Stephen Thaler v The Comptroller-General* [2020] EWHC 2412 (Pat), [2020] 9 WLUK 227.

81 *Stephen Thaler v Comptroller* (n 75) [47], [51], [102] and [116]. By the closure of writing, this was the latest decision on the DABUS applications in the UK. An appeal to the Supreme Court has been filed.

82 ibid [130].

the owner of an existing tangible property in relation to a new intangible subject matter created by that tangible property.[83]

In contrast, Lord Justice Birss found that Thaler had complied with the formal requirements of s 13(2) of the Patents Act as he had identified something he believes to be the inventor and had indicated the derivation of right to a patent.[84] Instead of relying on a legal basis for derivation of the title, Lord Justice Birss argued that Thaler is in the best position to file a patent application and obtain a patent and there seems to be no other person 'with a better right' than him.[85] The right to a patent was supposed to be derived on the basis of creation, ownership and operation of a machine.[86] In the majority view, however, it was concluded that since DABUS was found to be no inventor in the legal sense and, in addition, as a machine it does not have rights, there is no way in which the title to the right to a patent can be derived from it.[87]

On 2 September 2021, the US District Court for the Eastern District of Virginia held that according to US patent law, inventors must be natural persons.[88] With reference to the established case law of the Federal Circuit, the district court held that '"[i]t is axiomatic that inventors are the individuals that conceive of the invention: [c]onception is the touchstone of inventorship," and that "[t]o perform this mental act [of conception], inventors must be natural persons and cannot be corporations or sovereigns.".'[89]

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83 ibid [136].

84 ibid [97] ii).

85 ibid [85]. How slippery this slope is will be shown in Chapter VIII.

86 ibid [82].

87 ibid [136].

88 *Thaler v Hirschfeld* 1:20-cv-903 (LMB/TCB) (ED Va Sep 2, 2021).

89 ibid 14. By the closure of writing, this was the latest decision on the DABUS applications in the USA.

On 30 July 2021, the Federal Court of Australia concluded that a 'patent can be granted to a legal person for an invention with an artificial intelligence system or device as the inventor.'[90] The reasoning behind the conclusion was that an AI-driven system can be an inventor because no provision in the Australian Patents Act 'expressly refutes the proposition that an artificial intelligence system can be an inventor'.[91]

With respect to the second issue of the transfer of the right to a patent, the court relied on the ordinary meaning of the term 'derive', as including 'to receive or obtain from a source or origin, to get, gain or obtain, and emanating or arising from'[92] and hence concluded that in this sense the right can be obtained from a machine. This reasoning offered by the court, however, does not engage with the provision in its entirety. As pointed out by the author of this thesis elsewhere, the statutory text of the Australian Patents Act, s. 15(1)(c) provides 'derives title to the invention', not merely 'derives'.[93] Since an AI-driven system does not have a legal personhood and thus cannot have a legal title to anything, no title can be derived from it in any of the above sense.[94]

To date, no high-profile copyright case in which the involvement of an AI-driven system in the process of creation of a work would be made transparent has appeared before courts. There are cases concerning computer-generated works that were, however, created by the method of conventional computing. Relatively recently though, there was a case heard in the US with a non-human entity as the aspirant author of a work which attracted

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90 *Thaler v Commissioner of Patents* [2021] FCA 879 [200]. By the closure of writing, this was the latest decision on the DABUS applications in Australia, but an appeal was filed.

91 ibid [118] and [72].

92 ibid [177]-[179].

93 Eva Janečková, 'AI as an Inventor: What We Can Learn from the Australian DABUS Case' (*Oxford Business Law Blog*, 30 September 2021) <https://www.law.ox.ac.uk/business-law-blog/blog/2021/09/ai-inventor-what-we-can-learn-australian-dabus-case> accessed 14 December 2021.

94 ibid.

attention of the copyright law community worldwide. It concerned a smiling macaque called Naruto who took a self-portrait with a borrowed camera.[95] The owner of the camera claimed copyright in the picture, not too dissimilarly from Thaler claiming patents for DABUS's inventions. The District court hearing this case confirmed that US copyright law recognises only human authors and human authorship.[96]

Since the authorities have considered the issue (i), ie whether an AI-driven system can be an inventor and thus named as the inventor in a patent application, in some length, this thesis touches on that issue only lightly in Chapter III. Otherwise, this thesis considers the law on this issue clear and concurs with the decisions handed down by the European Patent Office and Lady Justice Laing and Lord Justice Arnold in this respect. Neither is there a question mark hanging above the fact that in Europe as in the USA, authors-creators must be human beings which will be briefly addressed in Chapter V. While the human nature of authors and inventors presents a relevant preliminary consideration for discussing authorship and inventorship, they are not the main concern of the present thesis.

4.2 Issues Dealt with in Public Policy Initiatives

In 2019, at the international level, the World Intellectual Property Organization launched a policy initiative on copyrightability and patentability of AI-driven systems' outputs. By asking, inter alia, '[s]hould the law define the line between AI-generated and AI-assisted outputs, and if so, how?'[97], it invited formulations of new definitions of these outputs dependent on the notion of AI and on (generating vs assisting) capabilities of AI-driven

95 *Naruto v Slater*, No 15-cv-04324-WHO, 2016 WL 362231 (ND Cal Jan 28, 2016). Appeal dismissed by the Court of Appeals for the Ninth Circuit, in No 16-15469.

96 ibid. For a more detailed discussion, see eg John Tehranian, 'Sex, Drones & Videotape: Rethinking Copyright's Authorship-Fixation Conflation in the Age of Performance' (2017) 68 Hastings LJ 1319, 1355.

97 WIPO (n 72) [15] (i).

systems. A similar approach was adopted by the UK policy initiative in the call for views announced in 2021. The UK Intellectual Property Office ('UK IPO') asks whether any changes should be adopted to 'protect AI devised invention through a new type of protection'.[98]

In the view presented here, the downside of such an AI-based approach is that, first, there is no universally accepted definition of AI even in the AI field itself (as mentioned above). This uncertainty will naturally impede the efforts towards defining AI for regulatory purposes. Second, the concept of AI is too fluid to consider it seriously as a conceptual basis for legal definitions.

To clarify this criticism in the light of the previous sections of this chapter discussing the capabilities of AI-driven systems: one of the points of that discussion above was to give evidence as to the existence of AI-driven systems with capabilities never seen before which make them (for now) inscrutable and unexplainable. The existence of such AI-driven systems and their outputs in the form of sonnets, paintings or technical solutions then justifies holding the AI and IP regulatory debate. Yet, in the view presented here, public policy makers should not get under the sway of a new technology and go as far as adopting an AI-focused approach to the whole AI and IP debate or introducing legal terms based on such an unclear and unstable term as AI.

In contrast, there are advantages to framing the AI and IP debate, more specifically the issues of copyright subsistence and patentability of human-AI productions, around the relevant human activity. The answer would then primarily depend on the definition of human activity or human intervention that makes the resulting invention or authorial work

98 UK IPO (72) 1.

merit protection.[99] If a human activity corresponding to the definition is found to having been involved in the process of devising or creating a particular subject matter, then the subject matter will constitute a human intellectual creation (a human-authored work or a human-devised invention). As such it can qualify for protection regardless of the nature of AI intervention in the process.[100]

4.3 Issues Debated in Scholarship

Since the scholarship covering the issues of the AI and IP debate has grown immensely, this thesis reviews only scholarship directly tackling the main concern of the thesis: copyrightability and patentability of outputs generated by AI-driven systems.[101] It also focuses mainly on a peer-reviewed scholarship.

The literature mapped below spans not only European jurisdictions but also the USA because of the shared basic principles of authorship and inventorship. A first-hand observation is that the reviewed papers are not in open polemics with each other (even if written on the law of the same jurisdiction). They rather run in parallel and thus dialogues are missing. This may be due to the confusion of terms or scholars having different understanding of the technical side of things.

In copyright, some scholars refer to their objects of interest as computer-generated works. Others offer their own definitions of the examined works or systems. For instance, Professor Boyden uses the term 'emergent works'—'works of apparently creative

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99 This approach is also taken by Jane Ginsburg and Luke Budiardjo, 'Authors and Machines' (2019) 34 Berk Tech LJ 343 Abstract.

100 Provided the AI-driven system does not intervene in a way that effectively breaks the chain of causation between the relevant activity and the resulting subject matter.

101 Outputs generated by AI-driven systems are any outputs made with any AI involved in the process of creation. They may be, but not necessarily have to be, what this thesis refers to as human-AI productions.

expression that arise from the operation of a program but cannot be traced directly to a human source'—and sees their authorship as a novel problem for copyright.[102] He proposes allocating authorship on the basis of answering a question 'whose meaning or message is embodied in that work'.[103] Consequently, the test for authorship 'should be whether the putative author foreseeably communicated that meaning to the audience'.[104]

In contrast to Boyden, Professor Grimmelmann denies the existence of a special kind of work simply because 'all works are computer-generated – or at least they might have been, which is close enough'.[105] Thereby authorship of computer-generated works does not pose a novel problem but rather reminds us that determining authorship requires (as it has always required) the making of 'objective legal judgements about the ultimate in human subjectivity: aesthetics'.[106]

Kaminski asks in a similar vein whether there is any copyright for works which 'are recognisably creative to a human audience, but are the result of machine creation rather than deliberate human input.'[107] She concludes that the answer depends on whether the copyright system aims to protect human authors or whether it serves to promote the interests of the audience.[108] If it were the latter, the outputs generated by AI-driven systems could be more easily absorbed by the copyright law.[109]

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102 Bruce Boyden, 'Emergent Works' (2016) 39 Colum JL & Arts 377, 378–79.

103 ibid 385.

104 ibid 394.

105 James Grimmelmann, 'There's No Such Thing as a Computer-Authored Work - And I''s a Good Thing, Too' (2016) 39 Colum JL & Arts 403, 415.

106 ibid 415.

107 Margot Kaminski, 'Authorship, Disrupted: AI Authors in Copyright and First Amendment Law' (2017) 51 UC Davis L Rev 589, 596.

108 ibid 592.

109 ibid 592.

Offering a slightly different perspective, Bridy suggests that the human creativity driven by the human brain may not be more than a mere algorithmic or computational creativity.[110] She claims that US copyright law 'does not expressly require human authorship.'[111] Thus outputs generated by AI-driven systems may qualify as works under US copyright law 'despite their non-human genesis, because they have a sufficient nexus to human creativity'.[112]

Professor Ginsburg and Budiardjo do not recognise any computational creativity nor authorship. According to them, '[a]sking whether a computer can be an author therefore is the "wrong" question; the "right" question addresses how to evaluate the authorial claims of the humans involved in either preparing or using the machines that "create".'[113] Their understanding is that copyright lands on the human who is in control of the AI-driven system. If the human designers 'control the inner workings of the system, they have also executed the resulting works'.[114] If no such human is to be found, the work, as an authorless work, falls outside of the scope of copyright protection.[115]

Professor Samuelson argues that the US Congress did not intend to give IP rights to machines and that, historically, such rights 'have been allocated only to humans'.[116] Moreover, machines should not be assigned copyright because, even though they could pass the originality requirement, they 'do not need to be given incentives to generate

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110 Annemarie Bridy, 'Coding Creativity: Copyright and the Artificially Intelligent Author' [2012] Stan Tech L Rev 5, 10–11.

111 ibid 20.

112 ibid 20.

113 Ginsburg and Budiardjo (n 99) Abstract.

114 ibid 409.

115 ibid 448.

116 Pamela Samuelson, 'Allocating Ownership Rights in Computer-Generated Works' (1986) 47 U Pitt L Rev 1185, 1199.

output'.[117] Among other alternatives, she suggests that no one should end up with copyright if the computer-generated objects are deemed a raw material in the public domain, 'just as a found object'.[118] Eventually, a user could get copyright in a work produced by transforming such raw material or found object.[119] More recently, in 2020, she reiterated her conclusion that the user is the one to be rewarded and incentivised because 'the user will often have adapted, rearranged, edited, or otherwise tinkered with the outputs to make them suitable for commercialization'.[120]

Similarly, Professor Clifford's assessment places outputs generated by AI-driven systems into the public domain since such objects 'cannot be protected under the current US copyright and patent laws'.[121] He adds that US copyright laws implicitly require an author to be human.[122] Thus the neural nets system which he examines, the Creativity Machine,[123] fails to be a 'legally recognized author who has created the work'.[124]

In addition, Deltorn and Macrez suggest that in cases where boundaries between human and computational contributions to a work are blurred,[125] a user of an AI-driven system may be deemed the author, 'as long as the user can manifest some control in the form of a choice over the created composition (selecting several parameters, iteratively

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117 ibid 1199.

118 ibid 1224–25.

119 ibid 1225.

120 Pamela Samuleson, 'AI authorship?' (2020) 63 ACM 20, 22.

121 Ralph Clifford, 'Intellectual Property in the Era of the Creative Computer Program: Will the True Creator Please Stand Up' (1997) 71 Tul L Rev 1675, abstract.

122 ibid 1682.

123 Made by DABUS's owner, Thaler, whom Clifford interviewed.

124 ibid 1681.

125 Jean-Marc Deltorn and Franck Macrez, 'Authorship in the Age of Machine Learning and Artificial Intelligence' in Sean M O'Connor (ed), *The Oxford Handbook of Music Law and Policy* (OUP 2019).

guiding the selection the output itself)'.[126] If the 'work is genuinely produced independently by an algorithmic process, without any significant human input' then it is considered to be in the public domain.[127]

In the UK, the situation is slightly specific because of a legal fiction of authorship for computer-generated works pursuant to Copyright and Patents Act 1988, s 9(3). Some scholars have expressed doubts about how this special provision will be interpreted and applied and how originality in such cases will be determined.[128] Bently and others list the possibilities for addressing the originality of a computer-generated work: requiring that the work is not copied or requiring that it is novel or by asking that if hypothetically created by a human being whether it would have required the usual kind and amount of skill, labour and judgment.[129]

Others, for instance Professor Guadamuz, consider s 9(3) clear as interpreted by Whitford J '[i]t is as unrealistic as it would be to suggest that, if you write your work with a pen, it is the pen which is the author of the work rather than the person who drives the pen'.[130] Guadamuz departs from this and comments that 'despite the apparent clarity of this argument, there is some ambiguity as to who the author is'.[131] This prompts a question how the special provision on authorship to computer-generated works can be clear and, at the

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126 ibid [3.2.3].

127 Jean-Marc Deltorn, 'Deep Creations: Intellectual Property and the Automata' (2017) 4 Frontiers in Digital Humanities 3 <https://www.frontiersin.org/articles/10.3389/fdigh.2017.00003/full> accessed 01 April 2019.

128 Lionel Bently and others, *Intellectual Property Law* (5th edn, OUP 2018) 117–18. Patrick Goold, 'The curious case of computer-generated works under the Copyright, Designs and Patents Act 1988' (2021) 2 IPQ 120, 121-122. Emily Dorotheou, 'Reap the benefits and avoid the legal uncertainty: who owns the creations of artificial intelligence?' (2015) 21 CTLR 85.

129 ibid 117.

130 Whitford J as quoted in Andres Guadamuz, 'Do Androids Dream of Electric Copyright? Comparative analysis of originality in artificial intelligence generated works' (2017) 2 IPQ 169, 176.

131 ibid 176.

same time, cause an ambiguity as to the correct allocation of authorship. At the normative level, Guadamuz would award the authorship of a computer-generated work to the user who acquires the program, while he considers any debate on originality of computer-generated works redundant because s 9(3) may provide for 'an exception to the creativity and originality requirements' for computer-generated works.[132]

A completely contrary account is offered by practitioners from Baker McKenzie London. In discussing the issue of originality of computer-generated works relatively thoroughly (thus they deemed it relevant), they predict that the English courts will interpret s 9(3) in way that gives copyright to the creator of the underlying AI algorithms.[133]

In respect of patents, Professor Abbott argues that the US Patent Office has already granted patents for inventions of computers, so these computers must have passed 'a sort of Turing test'[134] administered by the office. He claims that although the requirements of human inventorship and the conception of invention as a mental act preclude computers from being inventors, 'otherwise computers independently meet requirements for inventorship'.[135] He adds that computers should be considered inventors because this would incentivise development of creative computers and such effects would be 'consistent with the purpose and intent' of the US constitutional basis for patents and copyright.

In contrast to Abbott, Hattenbach and Glucoft assert that '[s]ection 103 [of the US Patent Act] was not actually intended to permit computer-generated inventions to be

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132 ibid.

133 Julia Dickenson, Alex Morgan and Birgit Clark, 'Creative machines: ownership of copyright in content created by artificial intelligence applications' (2017) 39 EIPR 457, 458–59.

134 Ryan Abbott, 'I Think, Therefore I Invent: Creative Computers and the Future of Patent Law' (2016) 57 BCL Rev 1079, 1109.

135 ibid 1081.

patented' even though the US courts have not yet explicitly ruled on such inventions.[136] However, they somewhat contradictory conclude that 'our current patent laws do not seem particularly well-suited to handling the proliferation of computer-generated publications and inventions'[137] and at the same time 'our present system remains reasonably well-suited to adjudicating the patentability questions of our time.'[138]

Ravid and Liu examining US patent law assume that AI-driven systems can generate inventions and that the established model of an individual inventor is not sustainable under such circumstances.[139] They assert that hardly any person in the process makes a significant contribution,[140] and so 'patent law is simply not applicable to inventions by AI'.[141] (However, they do not make it clear how they have established the inapplicability of patent laws and in the very following section they conclude that 'current subject matter eligibility doctrine might be well equipped to analyse AI systems.'[142]) They further criticize patent laws for being outdated and inefficient[143] and suggest alternative means of protection 'for inventions by AI'.[144] Although concurring with Ravid and Liu in the conclusion as to patentability of outputs generated by AI-driven systems, Davies reasons differently:

136 Ben Hattenbach and Joshua Glucoft, 'Patents in an Era of Infinite Monkeys and Artificial Intelligence' (2015) 19 Stan Tech L Rev 32, 44.

137 ibid 51.

138 ibid 51.

139 Shlomit Yanisky Ravid and Xiaoqiong Liu, 'When Artificial Intelligence Systems Produce Inventions: An Alternative Model for Patent Law at the 3A Era' (2018) 39 Cardozo L Rev 2215, 2229–30.

140 ibid 2235.

141 ibid 2247.

142 ibid 2250.

143 ibid 2263.

144 ibid 2260.

computers, instead of their owners, should be deemed inventors because there is no explicit legal requirement for human inventorship.[145]

Ramalho, engaging with patent law in the USA and Europe concluded that outputs of AI-driven systems 'can in principle be patentable subject-matter in all three jurisdictions'[146] and may be granted patents as far as 'a human is still, to a greater or lesser extent, involved'.[147] Professor Blok takes a similar approach to the use of AI-driven systems in inventive endeavours. He perceives them as mere tools whose use should not bar the invention from patentability because it 'is the result that counts'[148] and not how it was conceived.

According to a study on inventorship in the USA, China, Japan, the Republic of Korea, the UK, Germany, France and Switzerland written by Professor Shemtov and commissioned by the EPO, in all these jurisdictions, inventorship by human inventors is required.[149] Though the definitions across jurisdictions differ, Shemtov argues that they share the same objective.[150]

> '[T]he objective of these is overall uniform: to identify the person that was responsible, wholly or partially, for what may be described as the intelligent and creative conception of the invention. Such notion of intelligent and creative conception refers to a contribution to the invention-making process that goes beyond the financial, administrative or mechanical on the one hand, while not being

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145 Colin Davies, 'An evolutionary step in intellectual property rights - Artificial intelligence and intellectual property' (2011) 27 Computer Law & Security Review 601, 606–07.

146 Ana Ramalho, 'Patentability of AI-generated Inventions: Is a Reform of the Patent System Needed?' <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3168703> accessed 01 April 2019.

147 ibid.

148 Peter Blok, 'The inventor's new tool: artificial intelligence - how does it fit in the European patent system?' (2017) 39 EIPR 69, 71.

149 The study covers inventorship in the eight jurisdictions on nine pages. Noam Shemtov, 'A Study on Inventorship in Inventions Involving AI Activity' (*EPO* February 2019) 5 <http://documents.epo.org/projects/babylon/eponet.nsf/0/3918F57B010A3540C125841900280653/$File/Concept_of_Inventorship_in_Inventions_involving_AI_Activity_en.pdf> accessed 17 December 2021.

150 ibid.

> abstract on the other hand. It needs to be of a creative nature but does not necessarily have to be inventive in the non-obvious sense.[151]

This suggests that any human intellectual engagement in the invention-making process that does not bring about anything inventive ('does not necessarily have to be inventive' see the extract above) suffices to give rise to human inventorship. In contrast to the above, Shemtov himself states in the same report that the EPO 'has been using a similar rationale to the above in distinguishing between technical and non-technical considerations for the purpose of inventive step assessment.' Hence the immediate connection between inventiveness, problem solving and human 'creative or "intelligent"'[152] contribution.

Professor Straus contributes to the debate by a critical note that the authorities dealing with the DABUS applications failed to examine the applications as to whether the claimed technical solutions have indeed been invented by DABUS as claimed by Thaler.[153] He also undertakes his own assessment that given the facts disclosed in European DABUS applications and publicly available facts about the US Creative Machine patent (which he equates with DABUS),[154] the formulation of the problem, selection of input, provision of data, encoding the information, all being considered 'decisive parts of the inventive concept'[155] could not have been done by DABUS, but needed human input.[156]

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151 ibid.

152 As Shemtov puts it. ibid 19.

153 Joseph Straus, 'Artificial Intelligence and Patenting: Some lessons from "DABUS" Patent Applications' in Concetto Costa and others (eds), *Studi di Diritto Commerciale per Vincenzo di Cataldo* (G. Giappichelli Editore 2021) 624.

154 It is fair to acknowledge that the patent for the Creative Machine to which Professor Straus refers was filed in 1994 so it may not be straightforward to equate the Creative Machine of ca 1994 with DABUS of ca 2020. USA patent US5659666A <https://patents.google.com/patent/US5659666A/en> accessed 31 December 2021.

155 ibid 626.

156 ibid.

In sum, the legal scholarship on copyrightability and patentability of outputs generated by AI-driven systems is varied in the conclusions it reaches and, where it reaches the same conclusion, it varies in reasonings to that conclusion.[157] There are scholars who advocate for treating outputs generated by AI-driven systems as any other works or inventions because they pose no novel problem for current law,[158] or because there is no explicit requirement for human authorship[159] and inventorship respectively,[160] or under the condition that humans are still, somehow, involved in the process.[161] A contrary view has been supported with reference to the human authorship requirement,[162] and a necessity to find a human to whom copyright or patent rights can be attached.[163]

Scholarship addressing the conceptions of authorship and inventorship is the closest prior art to this thesis. In patent law, the scholars seem to agree that human input in the process of inventing is needed, and they assert that the required human inputs are currently present in the processes of invention that involve AI-driven systems (Straus, Kim, Ramalho and Shemtov). In copyright law, the scholars mostly agree that 'some control' (Deltorn and Macrez, Ginsburg and Budiardjo) or 'sufficient nexus' (Bridy) are needed and some ask

157 A more specific literature review is offered in Chapter IV on human authorship, including literature touching on copyrightability of outputs of AI-driven systems.

158 Grimmelmann (n 105), Kim (n 55).

159 Bridy (n 110).

160 Davies (n 145).

161 Ramalho (n 146).

162 Samuelson (n 116), Clifford (n 121).

163 Ginsburg and Budiardjo (n 99).

'whether and to what extent, a natural person's involvement with the AI-assisted output is […] sufficient'[164] (Hugenholtz and Quintais).[165]

In spite of the agreement about the need for some human input, in both patent law and copyright scholarship, there is neither agreement nor certainty regarding the nature of the required human inputs, including the specification of the necessary and sufficient degree and kind of human input which is required. Hence, the ambiguity about the nature of human authorship and human inventorship persists and this thesis aims to address it.

On top of what the scholarly contributions offer, this thesis asks a more subtle and fundamental question not yet seriously addressed by scholarship. The main concern of the present thesis is whether authorities deciding the issues of copyright subsistence and patentability have the analytical tools and methods to distinguish subject matter that owe their existence to a human author or inventor from other subject matter.[166] Addressing this concern should prove useful in relation to the normative issue of the AI and IP debate since the authorities' epistemic approaches present certain limitations in this respect.

5 CONCLUSION

This chapter concludes that the following technical facts are relevant for intellectual property law and policy: there are AI-driven systems which can determine the expressive elements of poems, photographs and paintings or technical features of solutions to technical problems and they can do it without the relevant human intervention or understanding. In technical terms, such AI-driven systems could be based on deep neural networks using

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164 Bernt Hugenholtz and João Quintais, 'Copyright and Artificial Creation: Does EU Copyright Law Protect AI-Assisted Output?' (2021) 52 IIC 1190.

165 A more thorough literature review focused on European human authorship is offered in Chapter V., including discussion of Hugenholtz and Quintais' arguments.

166 Ginsburg and Budiardjo (n 99) 436 touched upon this lightly.

various types of training, ie involving a combination of various levels of human interference with training and absence of human intervention and understanding in the process of creation (of final outputs; not creation of the neural network architecture or training the MLA).

The documented achievements of some AI-driven systems legitimise the AI and IP debate. This debate concerns factual, doctrinal and normative issues of authorship, inventorship and creation of works and inventions which are often intermingled. These overlaps together with legal scholars, judges and policy makers holding different opinions on the capabilities of AI-driven systems (or using different vocabulary to describe them) hinders development of constructive dialogues. Nonetheless, the debate moves forward with the first courts' decisions and public policy initiatives paving the way.

While the scholarship analyses authorship and inventorship, it does not engage with these conceptions in a detail appropriate to capture the changes in the processes of creation brought about by the advancements in AI. This thesis attempts to remedy this and thus examines human authorship and human inventorship from more than one perspective and in more detail. In addition, while the scholarship is occupied with possibility and desirability of protection for outputs generated by AI-driven systems, this thesis is interested in the epistemic aspects: how to distinguish novels, paintings, sonnets, music created by human authors from novels, paintings, sonnets, music made by a machine in the absence of human authorship? How to distinguish technical solutions devised by a human inventor from technical solutions made by a machine in the absence of human inventorship?

CHAPTER III.
INVENTORSHIP IN EUROPEAN PATENT LAW

1 INTRODUCTION

Answering the question on distinction between technical solutions devised by a human inventor (devised inventions) and technical solutions made by a machine in the absence of human inventorship starts with defining the concept of human inventor and inventorship. A related question is whether human inventorship matters for patentability of a subject matter or whether patents can be granted regardless of the subject matter's origin and history of production.

This chapter argues that in European patent law the history of an invention is relevant to its patentability, and that this becomes obvious when the law is read holistically and in the light of its factual assumptions and theoretical underpinnings. The present chapter describes the link between inventorship and patentability and how the former could be leveraged to improve assessment of the latter with a view of distinguishing devised inventions and other subject matter.

First, this chapter explores the conceptions of inventors and inventing for ownership purposes in the patent laws of the UK, Germany and France. The brief analysis of joint inventorship, co-inventorship and usurpation of patents cases reveals that the inventor is not just any individual who is intellectually involved in the production of inventions. Only the natural person who has actually devised (the UK), made (Germany) or originated (France) the inventive concept or the essence of the invention can qualify as the inventor.

Then the chapter proceeds to interrogating the impact of the long-established assumptions on human inventorship on drafting of the European Patent Convention

('EPC')[1] as well as examination practices of the European Patent Office ('EPO'). It shows that human inventorship is both presupposed for an invention to exist and required for a legitimate grant of a European patent. However, despite the origin of an invention being of significance for the legitimate grant of a European patent, the EPO does not have the corresponding competence to examine or verify who the inventor truly is and hence whether the claimed invention has the required human origin.

Guided by the premise that if inventors are individuals who have actually devised, made, or originated an invention then an invention is a subject matter having been devised, made or originated by individuals, the present chapter seeks to identify reflections of human inventorship in the EPC patentability criteria. Eventually, this chapter argues that human inventorship is reflected and is implicitly present in the requirements of invention and inventive step. While under the invention requirement a subject matter is required to having been devised through a human creative intervention, the inventive step requirement demands an intellectual activity of inventive quality. A brief analysis of the US Supreme Court's interpretation of the US patentability criteria confirms that conditioning grant of a patent upon human creative activity being involved in the process of inventing is nothing particular to European patent law.

[1] Convention on the Grant of European Patents (European Patent Convention) of 5 October 1973 as revised by the Act revising Article 63 EPC of 17 December 1991 and the Act revising the EPC of 29 November 2000.

2 INVENTORS IN POSITIVE LAW

2.1 Inventors in the Paris Convention

By the time of drafting of the first international patent law instrument, the Paris Convention, ie the 19th century, the common understanding was that only human beings were capable of coming up with solutions to technical problems or, put in other words, to invent.[2] This was reflected in Article 4ter of the Paris Convention which guarantees a moral right of an inventor to be named as such in the patent.[3] In intellectual property law, moral rights are non-economic rights whose objective is to protect the dignity and personality of authors and inventors. As such they are associated with human beings only and hence the assumption embodied in that provision was that the inventor is a human being. Recognising and providing for the moral right of the inventor caused no noteworthy controversies among the drafters of the Paris Convention.[4] There are no indications that the drafters would have regarded inventors as including any other entities than human beings. Human inventorship was not debated as a potential condition for patent validity because the Paris Convention did not aim to harmonize substantive patent law.[5]

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2 Encyclopaedias list only human beings and no other intelligent entities as inventors. For instance, Brian Duignan, 'Inventors and Inventions of the Industrial Revolution' (*Britannica*, no date) <available at https://www.britannica.com/list/inventors-and-inventions-of-the-industrial-revolution> accessed 12 January 2021.

3 Paris Convention for the Protection of Industrial Property 1883, as revised at Stockholm in 1967, art 4ter: 'The inventor shall have the right to be mentioned as such in the patent' read in conjunction with Georg Bodenhausen, *WIPO Guide to the Application of the Paris Convention* (BIRPI 1968), 64 wherein it is explained that the right under Article 4ter is 'commonly called a moral right'.

4 Sam Ricketson, *The Paris Convention for the Protection of Industrial Property A Commentary* (OUP 2015) 389.

5 ibid 443ff. In contrast, the Agreement on Trade-Related Aspects of Intellectual Property Rights sets out substantive patentability criteria such as invention or inventive step. However, it does not define those notions and they are left to be defined 'in good faith' by the Members. Carlos Correa, *Trade Related Aspects of Intellectual Property Rights: A Commentary on the TRIPS Agreement* (2nd end, OUP 2020) Ch 9.

2.2 Concept of Inventor in the UK

In the current UK patent law, inventor is defined as the actual deviser of the invention.[6] To recall from the previous chapter, the Court of Appeal has recently relied on this section as it found that 'DABUS does not qualify as an "inventor" within the meaning of the 1977 Act because it is not a person.'[7] From the context, if follows that by a person the Court of Appeal meant a natural person[8] though this was not spelled out. The Court of Appeal also acknowledged that inventors as creators enjoy moral rights under the Patents Act, s 13(1)[9] which further substantiates the conclusion that an inventor must be a natural person.[10]

In *Yeda v Rhone-Poulenc*, Lord Hoffmann for the House of Lords embraced Laddie J's formulation of inventor as 'the natural person who came up with the inventive concept' and emphasised that

> [t]he word "actual" denotes a contrast with a deemed or pretended deviser of the invention; […] It is not enough that someone contributed to the claims, because they may include non-patentable integers derived from prior art[…] Deciding upon inventorship will therefore involve assessing the evidence adduced by the parties as to the nature of the inventive concept and who contributed to it. In some cases this may be quite complex because the inventive concept is a relationship of discontinuity between the claimed invention and the prior art.[11]

This succinct paragraph contains several important points. First, the designation of the actual deviser as the inventor and the correct attribution of rights to patents is not a mere

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6 Patents Act 1977, s 7(3).

7 *Stephen Thaler v Comptroller General of Patents Trade Marks and Designs* [2021] EWCA Civ 1374, [2021] 9 WLUK 172 [123].

8 ibid [117].

9 ibid [121].

10 For more details, see Chapter II.

11 *Yeda Research and Development Co Ltd v Rhone-Poulenc Rorer International Holdings Inc* [2007] UKHL 43 [2008] RPC 1 [20].

formality but it matters for its substantive law consequences.[12] Lord Walker called the right arising out of the act of invention as 'a sort of inchoate property in the invention' to be fully realised by the grant of a patent.[13]

Second, the relevant activity or contribution is relatively narrowly defined. An inventor is not any person intellectually involved in production of inventions. They are only natural persons who did the actual inventing and 'came up with the inventive concept'.[14] This does not mean that the activity of inventing must be predictable nor that the inventors must always anticipate what is coming, especially in the trial-and-error method of inventing.

Yeda v Rhone-Poulenc concerned an invention resting on a combined treatment with a monoclonal antibody which was '"surprisingly discovered"'.[15] Even though the monoclonal antibodies were supplied by another scientist, Weizmann scientists were the one who 'had started with an antibody-drug conjugate but during the course of research they "unexpectedly discovered that the unconjugated mixture of drug and antibody in the control produced synergistic and beneficial results".'[16] The Weizmann scientists were basically testing two things: a drug and an antibody to find which one rendered better results. They ended up with a discovery that it was the two of them combined and that was claimed to constitute the inventive concept. The mention of the surprising discovery did

12 Also Lord Hoffmann in ibid [19]: 'In my opinion, therefore, the first step in any dispute over entitlement must be to decide who was the inventor or inventors of the claimed invention. Only when that question has been decided can one consider whether someone else may be entitled.'

13 ibid [53].

14 *University of Southampton's Applications* [2005] RPC 220, 234.

15 *Yeda v Rhone-Poulenc* (n 11) [4].

16 ibid [11]

not seem to have lessened their claim before the House of Lords.[17] Hence, coming up with an inventive concept need not to mean to predict the results of experiments with precision.

Third, it is not entirely implausible to argue that the passage signals the link between the conception of the inventive concept and making the actual inventive step. Lord Hoffmann defines the inventive concept as 'a relationship of discontinuity between the claimed invention and the prior art'[18] whereby such discontinuity corresponds to the gap between the invention and where would a person skilled in the art go under the current inventive step test (Chapter III.).[19]

A simpler invention than in *Yeda v Rhone-Poulenc* appeared before the Court of Appeal. Professor Howse obtained a patent for a cockroach trap which worked on the principle that insects' feet alight on the electrostatic talcum powder and they die.[20] Mr Metcalfe of IDA suggested to Professor Howse that magnetic powder should work in the trap.[21] Following the suggestions, Professor Howse made a few experiments, found out that it worked and filed for a patent containing the features of his patented invention whereby the talcum powder was replaced by magnetic powder.

The Court of Appeal found that the inventor in the sense of the actual deviser is Metcalfe. Jacob LJ found that the contribution brought by Professor Howse was the common general knowledge for those in the art: '[t]here was nothing inventive about it and

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17 Though the House of Lords was not applying the laws to the facts of the case. 'If the invention was made by the Weizmann scientists, there is no dispute that Yeda is entitled under paragraphs (b) or (c). Likewise if the invention was made by Dr Schlessinger and his team.' ibid [19].

18 ibid [20].

19 But it should be acknowledged that one cannot infer much from the 'inventive concept' because, as put by practitioners, it needs to be 'treated with particular caution. In three respects it is used in mutually inconsistent ways.' David Gibbins and Gregor Grant, '"Inventive concept" - is it a good idea?' (2005) 5 EIPR 170.

20 *IDA Ltd v University of Southampton* [2006] EWCA Civ 145, [2006] RPC 21 [2]

21 ibid [3].

I do not see how Professor Howse could fairly be described as an inventor. The "heart" was Mr Metcalfe's idea and his alone.'[22]

Hence, in this case, by suggesting the use of magnetic powder, Metcafle legally speaking provided the technical feature that implied the inventive step and came up with the inventive concept which made him the inventor. Similarly to Lord Hoffmann's account of inventorship, the activity of inventing is narrowly defined, and it is focused on the technical feature(s) due to which the invention overcomes the inventive step bar.

A related issue is the one of when the invention came into existence. Before inventorship can be claimed, the invention must be complete in the sense that it is enabling. The Court of Appeal in the same case added that supplying a non-enabling idea is not sufficient.[23] 'Those who contribute enough information by way of necessary enablement to make the idea patentable would count as "actual devisors", having turned what was "airy-fairy" into that which is practical.'[24]

In *Henry Brothers v MOD*,[25] the Patents Court held that '[o]ne must seek to identify who in substance had been responsible for the inventive concept, namely the combination: whose idea it had been which turned a useless collection of elements into something which would work.'[26] Although the concept of responsibility could evoke more broadly defined activity of inventing, the latter part of the sentence puts it back in its place as a narrow definition of coming up with an idea that makes the invention functioning.

All in all, to merit the status of an inventor under the UK patent law, a person must

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22 ibid [33].

23 ibid [39].

24 ibid [39].

25 *Henry Brothers (magherafelt) Ltd v The Ministry of Defence and the Northern Ireland Office* [1997] RPC 693, [1997] 6 WLUK 52.

26 ibid 706.

originate the inventive idea or contribute information necessary to make the idea patentable and thus enable the invention to work.[27] Contributions as to providing resources would likely not count.[28] Similarly, entrepreneurial or managerial contributions are unlikely to be seen as inventive contributions.[29]

2.3 Concept of Inventor in France

The French patent system was founded on 'personal character of patent rights' by a decree in 1762.[30] Historically, a patent could be granted to the 'author'[31] of the invention or to another person to whom 'the right of the inventor is validly transferred'.[32] From Blanc's account of the French patent statute of 8 July 1844 we can learn that the act of granting a patent was merely declaratory, ie merely recognising an already existing right of the inventor to their invention: 'Every new discovery or invention in all the areas of industry vests in its author, under the conditions and for the time determined hereafter, the exclusive right to exploit to his profit the said discovery or invention.'[33]

This is no longer the case and French patent law does not recognise any private rights of the inventor to the invention except for a moral right. Only the act of filling a patent application, as an act of will, realises the appropriation of the invention for the profit of the

27 *IDA v The University of Southampton* (n 20) [39].

28 *Yeda v Rhone-Poulenc* (n 11) [11].

29 Lionel Bently and others, *Intellectual Property Law* (5th edn, OUP 2018) 627.

30 Jean Marc Mousseron, *Le droit du breveté d'invention* (Librairie générale de droit et de jurisprudence 1961) 239.

31 Etienne Blanc, *L'inventeur breveté, code des inventions et des perfectionnements* (3rd edn, Cosse 1852) 256.

32 ibid.

33 ibid 254.

applicant.[34] Pursuant to the French Intellectual Property Code[35] the grant of rights to a patent is constitutive of 'the exclusive rights to exploit the invention'.[36] Since these commentaries refer to the constitutive character of the grant of a patent in relation to the rights to exploit the patent without mentioning the paternity right, they can be read as to support a view that any decisions of authorities with respect to the paternity right remain merely declaratory as they previously used to be.

Under French law, the patent rights belong to the inventor and any exceptions from this principle may arise only on the basis of the statute.[37] If a person considered to be an inventor does not fall into any of the statutory exceptions, like an intern who was neither an employee nor a public official of the research institute where he worked, then those persons themselves are entitled to the invention.[38]

To apply the exceptions based on the employment relationship, it is necessary first to search for the moment when the essence of the invention came to existence. If an employee left the employer when the process of invention was in stage in which the invention could be realised in a short time, such as invention should be considered as qualifying for application of the provisions on employees' inventions.[39]

Conversely, the provisions on employees' inventions do not apply to an employee whose employment contract was concluded after 'the essence of the invention which

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34 Mousseron (n 30) 182.

35 *Code de la propriété intellectuelle* (Loi n° 92-597 du 1er juillet 1992 relative au code de la propriété intellectuelle, as amended) ('French Intellectual Property Code') art L 611-1.

36 Jean Bruguière, *Code de la propriété intellectuelle* (22nd edn, LexisNexis 2021) 484. Similarly Jacques Azéma and Jean-Christophe Galloux, *Droit de la propriété industrielle* (7th edn, Dalloz 2012) 233.

37 Bruguière (n 36) 490.

38 Cour de cassation, Decision of 25 April 2006, JCP E 2006, 1806.

39 Bruguière (n 36) 490.

consisted of an idea'[40] was formulated. The importance of 'the date on which the invention was conceived',[41] ie the date on which the inventor described its characteristics, was emphasised in case law. If none of these is explicitly questioned, it is presumed that the applicant is the entitled person.[42]

The question remains what a person must do to merit the status of inventor. Here, the French Intellectual Property Code is of no help and the co-inventorship or employees' inventions case law addresses inventorship more than succinctly. For instance, to succeed in deregistering an already registered co-inventor of an invention subject of an already issued patent, it is necessary to prove that they did not participate in the conception of the invention and absence of their interventions in the conception of the invention.[43]

In cases involving fair remuneration for employees which is a consideration laid down by the statute in exchange for attribution of the exploitation rights to the employer, the courts work with evidence concerning the process of invention and are led by the contributions brought by concrete employees. For instance, the court in Paris found that the inventor collaborated on devising a method of avoiding infection by a virus that was based on genetic manipulation carrying the recombinant of the virus and aimed at medical use on humans with two other co-inventors.[44] In a discussion with another expert, the co-inventor formulated the problem (ie obtaining the recombinants of adenovirus) and then proposed to build the genomes of adenovirus in E-coli bacteria by genetic recombination, something which was not done before.[45] During this conversation they also realised that some

40 Cour d'appel de Toulouse, Decision of 22 March 1999, PIBD 1999 679 III 273.

41 TGI de Paris, Decision of 10 April 1992, PIBD 1992 529 III 483.

42 Cour d'appel de Paris, Decision of 24 May 1994 as rephrased and referred to in Bruguière (n 36) 487.

43 Cour d'appel de Paris, Decision of 26 June 2018, PIBD 2018 1101 IIIB 573.

44 TGI de Paris, Decision of 11 October 2011, n° 08-00908.

45 ibid.

envisaged steps in the process are not technically necessary which meant a significant saving of time in the whole process. For these reasons, the co-inventor claimed 'being at the origin of the conception of that invention [and] evaluate[d] his inventive contribution at 40% proportion of co-inventivity'.[46]

In another case on co-inventorship, the Court of Appeal in Orléans referred to difficulties that occurred in the process of production of a novel device. The question was whether any significant contributions were made by the putative inventor to the conception of the device.[47]

Though the courts tend to see the inventor as someone who took part in the conception of the invention, no consistent definition of inventorship emerges. It seems that an invention is required to be conceived by a human being. As the case law on employees' inventions shows, it is important to determine the time of conception of the 'essence of invention' to determine whether inventorship can be attributed to a concrete employee. The question is how far human beings may be from bringing about the inventive technical features and still meet the human conception condition. In contrast to the UK patent law with its narrow definition of inventing as coming up with the inventive idea, the French patent law does not seem to give clear answers as to what inventing as conceiving an invention entails.

46 ibid.

47 Cour d'appel d'Orléans, Decision of 24 January 2008, n° 07-00736.

2.4 Concept of Inventor in Germany

The German Federal Patent Court decided a case featuring DABUS patent applications in mid-November 2021. However, the judgment 11 W (pat) 5/21 was only presented orally and no written copy of the judgment was executed by the closure of writing of this thesis.[48]

Besides the DABUS affair, in Germany the inventor's rights are recognised as a result of making an invention without any need for registration or formalities.[49] These monistic rights consist of an economic right to a patent[50] and personal inventor's right.[51] The personal inventor's rights belong to personality rights for which it is typical that they cannot be transferred, alienated or waived.[52] These rights exist independently of whether the invention will eventually be found patentable or not and can be invoked against certain uses of the invention by third parties.[53] The inventor is originally entitled to the right to a patent pursuant to §6 of the German Patent Act which right arises upon completion of the invention and its disclosure.[54]

As Mellulis, a former German Supreme Court judge writes, an invention 'is necessarily the result of human creative activity'[55] and the inventor is the de facto 'author

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48 This information was obtained via email communication between the author and the legal representative of Thaler, on file with the author.

49 Maximilian Haedicke, '§3 Ownership A. Inventor and inventor right' in Maximilian Haedicke and Henrik Timmann (eds), *Patent law: a handbook on European and German patent law* (CH Beck 2014) 243.

50 The right to a patent is deemed to flow from the inventor's rights. *Pneumatische Einrichtung*, Decision of 6 October 1981, X ZR 57/80 [1982] GRUR 95.

51 Haedicke (n 49) 243.

52 Klaus-Jürgen Mellulis, 'PatG § 6 [Recht des Erfinders]' in Georg Benkard (ed), *Patentgesetz* (11th edn, CH Beck 2015) Rn 22.

53 *Steuervorrichtung*, Decision of 18 May 2010, X ZR 79/07 [2010] GRUR 817.

54 Mellulis (n 52) [1], [6], [7].

55 ibid [31].

of the invention.'[56] Or, as put by the Supreme Court: an invention is due to 'a creative act of inventor'.[57] Making an invention is a real act[58] which implies that whether inventing happened and who did it is a question of fact.

To claim inventorship, the invention must be completed. As the Supreme Court explained, this means that the inventor has a clear idea that an invention can be implemented into the practice without any further experiments or tests.[59] In a more recent case, it was found that whether an invention is completed ought to be ascertained on the basis of whether it can be worked by an average person skilled in the art, not according to the opinion of the inventor.[60]

To establish inventorship, the courts are invited to consider the way in which the invention subject of the patent (without limiting themselves to the text of patent claims) came into being.[61] It also must be proven which act had brought the invention about.[62] The contribution of the right kind is towards solving a technical problem and thus the process of invention seems to be delineated by the specific technical problem.[63]

More specifically, the Supreme Court found that making an invention involves 'developing one own's knowledge with which one can solve a concrete technical problem by certain technical means and disclosing this knowledge […] as an instruction that can be

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56 ibid [34].

57 *Steuervorrichtung* (n 53).

58 Christoph Ann, '§ 19. Erfinderprinzip und Erfinderrecht' in Rudolf Kraßer and Christoph Ann (eds), *Patentrecht* (7th end, CH Beck 2016) [10].

59 *Spanplatten*, Decision of 5 May 1966, I ZR 110/64 [1966] GRUR 558.

60 *Wildverbißverhinderung*, Decision of 10 November 19770, X ZR 54/67 [1971] GRUR 210.

61 *Atemgasdrucksteuerung*, Decision of 17 May 2011, X ZR 53/08 [2011] GRUR 903.

62 ibid.

63 The problem must be specific, for instance how to eliminate shaking produced by a motor chain saw in *Motorkettensäge.* Ann (n 58) [20].

used for technical implementation'.[64] The coming up with an independent and creative contribution to solve a specific problem was also emphasised in scholarship.[65] According to the Supreme Court, thoughts and suggestions of both aspirant co-inventors may have contributed to the invention had they both been pre-conditions for the invention to exist.[66] However, not every pre-condition can do the trick: bringing too common suggestions or plain, not concretised ideas does not make one an inventor.[67]

There seems to be some uncertainty about whether the inventorial contribution must be above an average skilled person's performance. On the one hand, former Supreme Court judge Mullulis refers to a need to bring about something which surpasses the common knowledge and the skills of an average man in the art.[68] On the other hand, in cases of co-inventorship, the bar seems to be rather low: only such contributions that did not influence the overall success and that were non-essential in relation to the solution to the technical problem do not count as co-inventorial.[69]

According to accounts coming from the courts and German scholarship, only an intellectual activity is relevant for establishing an inventorial contribution.[70] Contributions that are closely linked to the invention but are short of having the character of intellectual activity such as providing funding, labour, setting up tools, testing prototypes or fulfilling other assistant tasks do not trigger co-inventorship despite their closeness to the actual

64 *Steuervorrichtung* (n 53) 820.

65 Martin Chakroborty '§3 Ownership A. Inventor and inventor right' in Maximilian Haedicke and Henrik Timmann (eds), *Patent law: a handbook on European and German patent law* (CH Beck 2014) 250.

66 *Motorkettensäge*, Decision of 20 June 1978, X ZR 49/75, [1978] GRUR 583.

67 Mellulis (n 52) [44].

68 ibid [35], [50].

69 *Motorkettensäge* (n 66).

70 For instance Mellulis (n 52) [44] and for others see below.

inventing.[71] Professor Haedicke too writes that the mere provision of 'accessories, laboratory space, providing personnel or financial aid do not equate to an inventive process and therefore do not make one entitled to a partial ownership of the patent.'[72] It is admitted that drawing a line between a co-inventor and a mere aid is possible only on a case-by-case basis.[73]

3 INFLUENCE OF ASSUMPTIONS ABOUT INVENTORSHIP

3.1 Right to be Named as the Inventor

Under Article 62 of the European Patent Convention, the inventor has the right, vis-à-vis the applicant for or proprietor of a European patent, to be mentioned as the inventor before the EPO.[74] This provision gives effect to inventor's moral right.[75] Correspondingly to Article 62, Article 81 of the EPC requires the applicant to designate the inventor and 'if the applicant is not the inventor or is not the sole inventor, the designation shall contain a statement indicating the origin of the right to the European patent',[76] namely the way the title was transferred to the applicant.[77]

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71 Ann (n 58) [17].

72 Haedicke (n 49) 244.

73 Alfred Keukenschrijver, '§ 6 Recht auf das Patent' in Rudolf Busse and Alfred Keukenschrijver (eds), *Patentgesetz* (de Gruyter 2016) [37].

74 EPC, art 62.

75 Peter Hess, 'EPC 2000, Art 62' in Richard Hacon and Jochen Pagenberg (eds), *Concise European patent law* (2nd edn, Kluwer Law International 2008) 67.

76 EPC, art 81 and Implementing Regulations to the EPC, rule 19(1).

77 Travaux préparatoires to the EPC 1973, Minutes of the Munich Diplomatic Conference for the Setting up of a European System for the Grant of Patents, M/PR/I, para 265 <https://www.epo.org/law-practice/legal-texts/epc/archive/epc-1973/traveaux.html> accessed 29 March 2021.

This compulsory mentioning of the inventor was unanimously agreed on at the Munich Conference with the Chairman concluding that 'all the delegations recognised the rights of the inventor and wished to protect them to the largest possible extent'.[78] From the minutes of the meeting it also follows that a Scandinavian delegations' proposal requiring the applicant to furnish a proof of their right to the invention was not adopted because the EPO could not be expected to handle national civil law matters.[79] Therefore, a compromise wording was adopted that applicants, if not themselves inventors, shall supply a statement indicating the origin of the right to the European patent.[80]

Additionally, in the view presented here, the responsibility for a correct designation of the inventor should not rest solely on the applicant. Some aspects of the intellectual property rights, namely moral rights and right to a fair remuneration, are universally recognised human rights.[81] Moral rights in particular share with human rights their characteristic inalienability and universality to all human beings. Therefore, it is first and foremost the responsibility of states that have subscribed to protection of human rights to enforce the moral rights. Hence the EPO, as an extended arm of the EPC Contracting Parties, should have a duty to effectively check compliance with Article 62 of the EPC.

The human rights nature of the right notwithstanding, the EPO does not verify the identity of the inventor designated in the patent application. It merely notifies the

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78 Travaux préparatoires to the EPC 1973, Volume 42 E, EPO, Munich 1999, M/PR/I, para 247.

79 ibid.

80 EPC, art 81.

81 Paul Torremans, 'Copyright (and Other Intellectual Property Rights) as a Human Right' in Paul Torremans (ed), *Intellectual Property Law and Human Rights* (3rd edn, Wolters Kluwer 2015) 226. Peter Yu, 'Reconceptualizing Intellectual Property Interests in a Human Rights Framework' (2007) 40 UC Davis L Rev 1039, 1081. Although Professor Torremans refers mainly to copyright, Professor Yu refers to sources close to the drafting procedure of the Universal Declaration of Human Rights and other human rights treaties that mention human inventiveness and creativity, intellectual creations, etc. This language and its context justify herein made extension of the arguments to patent law.

designated inventor where the applicant is a different person.[82] From a different angle though, the EPO at least checks whether the formal requirements of the patent application have been complied with,[83] including whether the inventor was designated in a request for grant of a European patent where the applicant is the sole inventor,[84] or whether the inventor was designated in a separate document where the applicant is not the inventor or the sole inventor.[85] In case these formal requirements are not met, the patent application shall be refused under Article 90(5) EPC.

In the context of European DABUS applications, the EPO found that they did not designate the inventor.[86] The EPO thereby confirmed that the EPC system presupposes that each invention has an individualised human inventor. It also makes clear that the failure to designate a human being as the inventor raises a formal obstacle to substantive examination of the patent application and thus grant of a European patent. Thereby, at least formally and implicitly, it is required that the invention the subject of a patent application has a human inventor.

The trouble is that in practice, in the event of a de facto absence of human inventor, the provision of Article 62 of the EPC securing the right of the inventor to be named becomes irrelevant. Next, it seems that the above-mentioned formal obstacle to the grant of a European patent can be (pragmatically rather than legally) overcome by merely naming a natural person as the inventor in the European patent application since the identity of the

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82 Implementing Regulations to the EPC, rule 19(3): 'If the applicant is not the inventor or is not the sole inventor, the European Patent Office shall communicate to the designated inventor the information in the document designating him […].'

83 EPC, arts 78 and 90.

84 Implementing Regulations to the EPC, rule 41.

85 ibid rule 19.

86 EPO, 'Press Communiqué on decisions J 8/20 and J 9/20 of the Legal Board of Appeal' (*EPO* 21 December 2021) <https://www.epo.org/law-practice/case-law-appeals/communications/2021/20211221.html> accessed 22 December 2021.

inventor is not verified by the EPO. The possibility of this manoeuvre exposes a shortcoming in the examination system as set out by the EPC and its Implementing Regulations. Consequently, subject matter that have a human inventor on paper only (and do not in fact have one) could proceed to substantive examination as if they were inventions devised by human beings.

3.2 Right to a Patent

Even if the problem of missing human inventor may seem of little practical consequence in the patent grant proceedings before the EPO (provided applicants put a name of a human being forward as a matter of formality), it becomes more intriguing when it comes to entitlement to a European patent.

Pursuant to Article 60(1) of the EPC, the right to a European patent shall belong to the inventor or his successor in title. This right comprises the 'inventor's personal right [that has as its object] the relationship of the inventor to their creation and a personal position and acknowledgment resulting therefrom'[87] on one hand and the material right to grant of a patent derived therefrom on the other hand.[88] The right to a European patent is an expression of a 'fundamental principle of almost all European patent systems'[89] and arises upon completion of the invention.[90] Thus, the personal right to a patent exists by virtue of the act of invention and it precedes the grant of the patent, ie the an act of state administration.

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87 Klaus-Jürgen Melullis, 'Patentfähige Erfindungen' in Georg Benkard (ed), *Europäisches Patentübereinkommen* (CH Beck 2002) 301.

88 ibid.

89 Travaux préparatoires to the EPC 1973, Texts Drawn Up by the Drafting Committee of Main Committee I at the Meeting on 12 September 1973, M/74/I/R 1, <https://www.epo.org/law-practice/legal-texts/epc/archive/epc-1973/traveaux.html> accessed 29 March 2021.

90 Haedicke (n 49) 244.

The EPC does not specify what one must do to gain the status of inventor and thus become originally entitled to the European patent. As neither the notion of inventor nor inventorship are defined in the EPC, if any question related to attribution of a patent arises, the respective national patent laws are to be applied. As outlined above, national laws in the UK, Germany and France define the inventor as a human being who actually devised,[91] made,[92] originated[93] an invention. The individual inventorship question as well as any disputes related to the entitlement are to be brought before national courts of the EPC Contracting States.[94]

Before the EPO, the person deemed entitled to exercise the right to a European patent is the applicant.[95] For this provision as well as for the EPO's lack of competence to examine the entitlement, a European patent may happen to be granted to a person who is not entitled to it, ie in breach of article 60(1) EPC. The remedy is that, in the post-grant phase, the European patent can be revoked by national courts of the EPC Contracting States (with the effect *ex tunc* and for the territory of the respective Contracting States) on the ground that its proprietor is not entitled to it[96] (further referred to as lack of entitlement).

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91 Patents Act 1977, s 7(3).

92 A person gains the status of an inventor when he 'makes an invention, so he himself acquires knowledge how to solve a particular technical problem with certain technical means […] and he discloses his knowledge […] as an instruction that can be used for technical implementation'. *Steuervorrichtung* (n 53) [28].

93 'The law attributes, […] the ownership to the invention to a person who originated it.' Pierre Sirinelli, *Code de la propriété intellectuelle* (19th edn, Dalloz 2019) 572.

94 EPC, art 61 and the Protocol on Jurisdiction and the Recognition of Decisions in respect of the Right to the Grant of a European Patent (Protocol on Recognition), art 1. See further Patents Act 1977, s 7(2), *Patentgesetz* of 16 December 1980 (BGBl 1981 I S 1) ('German Patent Act') §6, French Intellectual Property Code, art L611-6.

95 EPC, art 60(3).

96 EPC, art 138(1)(e) (Article 138 Revocation of European patents / *Artikel 138 Nichtigkeit europäischer Patente* / *Article 138 Nullité des brevets européens*).

Taking this together, a European patent is legitimately granted only if it is granted to the human inventor of the underlying invention the subject of the patent application or their successor in title. Should a European patent be granted despite its proprietor's lack of entitlement, such a patent is open to a revocation attack. If revoked, it is then treated as if it had never been granted in the first place.

As the revocation on the ground of lack of entitlement is governed by national laws, the revocation proceedings in the EPC Contracting States differ to some extent. For instance, in the UK, they can only be initiated by a person who was found by the court or the comptroller to be entitled to be granted that patent.[97] In Germany, application for the revocation can be brought only by an interested party, and, in case of usurpation only by the injured party.[98] In France only the inventor or their successor in title can file the application for the revocation on the ground of lack of entitlement.[99]

This excursion to national patent laws, albeit brief, shows that the initiation of national revocation proceedings on the ground of lack of entitlement under Article 138(1)(e) of the EPC lies largely in the hands of the inventor or their successor in title. This is reinforced by the fact that neither the EPO nor national patent authorities (at least in the UK, France and Germany)[100] check the entitlement ex officio. As observed by Marcus Smith J in relation to the UK DABUS patent application, applicant's statements concerning the identity of an inventor or succession in title cannot possibly be audited by national

97 Patents Act 1977, s 72(1)(b) in conjunction with s 72(2).

98 German Patent Act, Nullity Proceedings and Compulsory Licence Proceedings (*Nichtigkeits- und Zwangslizenzverfahren*) §81(3).

99 Cour de cassation, Decision of 14 February 2012, PIBD 2012 960 IIIB 263.

100 Intellectual Property Office, *Manual of Patent Practice* (UK IPO 2016) [13.12]. The accuracy of inventor's designation is not verified by the German Patent and Trade Mark Office, German Patent Act, §37. Pursuant to the French Intellectual Property Code, art. 611-15, the INPI does not verify the designation of the inventor.

patent authority in each case.[101] Consequently, in practice, in the de facto absence of a human inventor, there seems to be no legal basis for revocation of a European patent due to lack of entitlement.

In sum, the EPC system presupposes the existence of an individualised human inventor and reflects this normatively, both in the inventor's designation and entitlement requirements under Articles 62, 81 and 60(1) EPC. Reading this in conjunction with the national definitions of inventor, a human being devising an invention is assumed to be a precondition for the existence of an invention as well as for the legitimate grant of a European patent. Hence, the human origin and history of an invention is of legal significance under the EPC system. However, as the existence of human inventors is taken for granted without verifying the inventors' status or legitimacy of applicants' entitlement declarations, the EPC system ceases to operate flawlessly in no-human-inventor scenario.

3.3 Patentability

Leaving the realm of individual inventors' rights and their relative claims, this article argues that (general) human inventorship is a necessary condition for the patentability of a subject matter. As shown above, the existence of an individualised human inventor and their inventorship are presupposed by the EPC (and the Paris Convention).

The presumption that each invention has an individualised human inventor subsumes a more general belief that an invention originates from a human being. More specifically, in the UK, German and French laws, the inventor is defined as someone who actually devised, made, or originated respectively an invention. Rephrasing this in a subject matter-centred fashion, an invention can be understood as something actually having been devised

101 *Stephen Thaler v The Comptroller-General* [2020] EWHC 2412 (Pat), [2020] 9 WLUK 227 [29].

or made by an inventor,[102] ie something owing its existence to a certain kind of human activity or intervention.

The proposition that the existence of an invention is predicated on human activity or intervention has been made on a number of occasions. For instance, Professor Pila recognises 'origination in an act of human creation (requiring a certain talent or capacity)' as one of the common definitional elements of intellectual property subject matter.[103] Elsewhere, Professor Sherman conceptualises invention as 'a product of a process in which a human agent (or inventor) exercises their inventive skills to build on, modify, or adapt preexisting natural materials'.[104]

Accounts along these lines can also be found in commentaries from civil law jurisdictions. Mellulis describes the importance of human activity for the concept of invention as follows: '[a]s a result of an intellectual activity by individualised natural persons the invention is necessarily connected with the inventor; an invention without inventor is not thinkable'.[105] Professor Haedicke writes that 'the prerequisite for every invention […] is an intellectual process of invention'.[106] Since the patent act 1936, German patent law has followed a so-called inventor doctrine (*Erfinderprinzip*) according to which 'no invention is conceivable without inventor.'[107]

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102 An argument along these lines was made by Marcus Smith J in ibid [45].

103 Justine Pila, *The Subject Matter of Intellectual Property* (Oxford 2017) 9. The monograph is focused on European and UK law.

104 Brad Sherman, 'What does it mean to invent nature?' (2015) 5 UC Irvine LR 1193, 1203. The article analyses US and Australian doctrine.

105 Mellulis (n 52) 310.

106 Maximilian Haedicke, '§3 Ownership A. Inventor and inventor right' in Maximilian Haedicke and Henrik Timmann (eds), *Patent law: A handbook on European and German patent* law (CH Beck 2014) 244.

107 Helmut Schippel, 'BGH 05.05.1966 Ia ZR 110/64 "Spanplatten"' [1966] GRUR 558.

The language of origination and intellectual process brings copyright to mind. Drawing a parallel between copyright and patents could be helpful to demonstrate the relationship between the activity of authoring (or inventing) and copyright subsistence (or patentability) of a resulting subject matter. Indeed, Professor Ginsburg argues that 'originality is synonymous with authorship'[108] while the conceptions of originality (and so the contribution required to gain the status of author) differ jurisdiction by jurisdiction.[109] At a more abstract level though, originality is an internationally recognised condition for copyright protection.[110] Hence, in principle, if a subject matter does not have any human author and thus lacks human authorship, not only there is no one entitled to copyright, but also, and more fundamentally, such subject matter is not eligible for copyright protection as an authorial work.[111]

It is curious that the connection between human inventorship (or human origin) and patentability of a subject matter does not attract much attention in modern scholarship.[112] Yet, scrutinising the patentability of subject matter that have not in fact been devised by a human inventor (but that might easily be disguised as having been so devised) is important for preserving the coherence and integrity of the modern patent system. Granting patents

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108 Jane Ginsburg, 'The Concept of Authorship in Comparative Copyright Law' (2003) 52 DePaul L Rev 1063, 1078.

109 ibid.

110 Originality or 'intellectual creation' as provided in the Berne Convention for the Protection of Literary and Artistic Works (Paris Act of 24 July 1971), as amended on 28 September 1979, art 2(1). '"[I]ntellectual creation" is implicit in the conception of a literary or artistic work'. Sam Ricketson and Jane Ginsburg, *International copyright and neighbouring rights: the Berne Convention and beyond*. Vol I (2nd edn, OUP 2006) 402.

111 In copyright law, this is more straightforward because no act of state administration is required for copyright to subsist. Berne Convention (n 110) art 5(2). In contrast to patent law, the UK copyright law contains a legal fiction of an author for computer-generated works in the Copyright, Designs and Patents Act 1988, s 9(3). This is addressed in Chapter V.

112 '[M]odern patent lawyers so rarely ask the question: what is the invention? […] Although the requirements for patentability do not include a discrete requirement that applicants be able to show that they have created an invention, it is clear that the invention occupies a pivotal place in patent law.' Alain Pottage and Brad Sherman, *Figures of invention: a history of modern patent law* (OUP 2010) 3.

for devised inventions as well as subject matter lacking a human inventor would eventually render the patent system incoherent and its outcomes inconsistent because it would mean treating fundamentally dissimilar objects equally. Therefore, it is pertinent to ask whether and if so how human inventorship is reflected in the statutory patentability requirements.

4 REFLECTIONS OF HUMAN INVENTORSHIP IN THE STATUTORY PATENTABILITY REQUIREMENTS

Pursuant to Article 52(1) of the EPC, 'European patents shall be granted for any inventions, in all fields of technology, provided they are new, involve an inventive step and are susceptible of industrial application'. Out of these statutory patentability criteria, this article focuses on the requirements for an invention and inventive step. At first glance, the requirement for an invention seems to be the closest reflection of human inventorship in positive law as the invention represents the inventor's contribution to the state of the art.[113] Equally, the requirement for an inventive step aims at identifying the inventor's intellectual contribution as it is suggested by its anthropomorphic phrasing.[114]

This chapter further considers the approach to interpretation and application of these requirements adopted by the EPO and courts in the UK, Germany, and France. These

[113] For instance, in German law (until the reform in 1968) the requirement for an invention and the requirement for inventive activity were not separate. Rather, the achievement or the contribution to the art was understood as the main patentability criterion. See Ralph Nack, 'Inventions and their amenability to patent protection' in Maximilian Haedicke and Henrik Timmann (eds), *Patent law: a handbook on European and German patent law* (CH Beck 2014) [24]. Or, '[t]he definition of an invention as being a contribution to the art […].' See *Factor-9/JOHN HOPKINS*, T 1329/04 of 28 June 2005, EP:BA:2005:T132904.20050628, [12].

[114] An invention is required to involve an 'inventive step', or 'inventive activity' pursuant to the EPC, art 56. Similarly, Professor Aplin chooses novelty and inventiveness when giving an account of creativity in patent law. Tanya Aplin, 'Creativity and the Law' in Lee Martin and Nick Wilson (eds), *The Palgrave Handbook of Creativity at Work* (Palgrave 2018). Put in other words, 'creativity reappeared in the form of the requirements of originality and non-obviousness, in which applicants had to show, in effect, that their respective works were creative.' Brad Sherman and Lionel Bently, *The Making of Modern Intellectual Property Law: The British Experience, 1760-1911* (CUP 1999) 200.

jurisdictions emerge from different legal traditions while adhering to the same patentability requirements harmonised by the EPC in 1973. This analysis indicates that despite these jurisdictions sharing the overarching legal basis and following the decision-making practice of the EPO,[115] they take marginally different approaches to application of the requirements.

Further, it shows that in the application stage, ie in the assessment of the requirement for an invention, the concept of 'invention' was reduced to designate merely a technical feature (the EPO, France), belonging to a technical field (Germany) and technical contribution (the UK). These approaches to application of the requirement for an invention ignore the possibility of a subject matter falling within a technical field or having a technical feature that may not constitute an invention because of lack of human origin (*Tomatoes/State of Israel*).[116]

In relation to the requirement for an inventive step, this chapter exposes that the notion of 'obviousness' overshadowed human intellectual aspects of the inventive step. The obviousness-based approaches can lead to finding non-obviousness in inventions that may not involve the relevant human intellectual activity. Though, the human intellectual aspects were recognised in *Actavis v ICOS* (the UK) and can be found in a typology of inventive activities (Germany, France).

4.1 Invention Requirement

The criterion of an 'invention' is a self-standing patentability requirement under the EPC[117] and any subject matter must first qualify for an invention. The rare instance where the

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115 The settled jurisprudence of the EPO on the interpretation of the EPC should normally be followed. *Actavis Group PTC EHF v ICOS Corporation* [2019] UKSC 15, [2019] Bus LR 1318 [56].

116 *Tomatoes/State of Israel*, G 0001/08 of 9 December 2010, EP:BA:2010:G000108.20101209.

117 *Estimating sales activity/DUNS LICENSING ASSOCIATES*, T 0154/04 of 15 November 2006, EP:BA:2006:T015404.20061115, [5].

nature of an invention has been more comprehensively considered by the most authoritative interpreter, the Enlarged Board of Appeal of the European Patent Office (EBA),[118] is *Tomatoes/State of Israel.*[119]

In response to, inter alia, the referred question of whether a method of crossing and selecting plants escapes the exclusion of Article 53(b) of the EPC of 'essentially biological processes', by virtue of containing an additional feature of a technical nature,[120] the EBA made a general statement that the 'essence of invention' is 'human intervention in a process in order to bring about a desired result'.[121] The EBA thus interpreted the concept of invention as requiring 'human intervention'[122] or an intentional abstention therefrom.[123]

Most recently, the EBA distinguished that there are two components of the invention requirement—an invention and technicity: 'from Article 52 EPC, it can be concluded that only "technical" inventions are patentable.'[124] In its decision concerning a simulation method (ie outside the biotechnology context) the EBA refrained from defining what

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118 The EBA is a quasi-judicial body of the EPO. It is tasked with ensuring a uniform application of the EPC, deciding points of law of fundamental importance and with a limited judicial review of decisions of the Boards of Appeal. EPC, arts 112 and 112a.

119 *Tomatoes/State of Israel* (n 116).

120 Even though the referral concerned interpretation of the EPC, art 53(b) primarily, this question hints at the category of 'as such' non-inventions under the EPC, art 52(2) and their saving through a step of technical nature. Thus, the EBA started answering the question by defining what technicity and invention under the EPC, art 52(1) mean.

121 *Tomatoes/State of Israel* (n 116) [6.4.2.3] and the same [6.4.2.1]. The same also *Broccoli/PLANT BIOSCIENCE,* G 0002/07 of 9 December 2010, EP:BA:2010:G000207.20101209, [6.4.2.1].

122 ibid [6.4.2.1]. It may be objected that the EBA contrasts 'human' to 'natural/biological intervention' in this decision. In the present view, it rather contrasts the effects of a human intervention and natural 'intervention' of sexual crossing on the resulting subject matter. The EBA distinguishes between technical steps that (i) merely enhance or assist the biological processes and those that (ii) change the result. In principle, inventions in all technical fields secure their technical character through human intervention in the nature. This applies to inventions in computer science (eg utilising electricity), chemistry (eg utilising properties of various materials), mechanics (eg utilising natural laws of motion), etc.

123 ibid [6.4.2.3].

124 *Simulation Method* G 0001/19 of 10 March 2021, EP:BA:2021:G000119.20210310 [75].

'technical' means. In the same breath, it embraced the conception of invention provided in *Tomatoes/State of Israel*.[125]

The EBA also added that the technicality of the invention 'implies that an object is created, or a process is run with some purpose based on human creativity'.[126] As an example contrasting with an invention, it referred to weather which is clearly not an invention; whereas 'a physical system that can be modelled in the sense of showing how it [weather] works' could be.[127] This was not elaborated further on because the main concern of the EBA in this decision was whether parts of a process defined by mathematical concepts such as 'a frustration function' were technical or not.[128]

From the EBA's case law, mainly *Tomatoes/State of Israel,* it follows that, first, the required human intervention must pursue the goal of achieving a desired result. Second, such an intervention must cause a durable and permanent change in the resulting subject matter (such as a genetic change in a living product[129]) and must be repeatable.[130] Thereby, the necessity of causal connection between a human being who intervenes in the world with a view to achieving a desired result and a materialised result was acknowledged.

More specifically, the understanding presented here is that if a subject matter is claimed as a product, then it corresponds to the 'desired result' from the EBA's statement. Then, a human intervention is an event preceding the invention (ie the result) which intervention is a necessary condition for the invention to exist. In other words, the invention would not have existed but for the human intervention. Given the required repeatability of

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125 ibid.

126 ibid [47] and [75].

127 ibid.

128 ibid [77].

129 *Tomatoes/State of Israel* (n 116) [6.4.2.3].

130 ibid [6.4.2.1].

the process,[131] this must be true every time the invention is worked. If this is true for every time the invention is worked, then this is also true for the very first occurrence of the invention (in the sense of human creation).[132]

If a subject matter is claimed as a process (a method), its qualification for an invention depends on incorporating a human intervention within its steps which intervention is causally determinative of the relevant elements of the desired result.[133] Such causally determinative human intervention is called human 'creative' intervention further on.

4.1.1 Invention vs Discovery

An invention (understood as a creation) is often juxtaposed to an unpatentable discovery. According to a Comparative Study of Substantive Law which influenced drafting of the EPC 1973 and its accompanying Community Patent Convention, '[a]s a general rule, a patent can only protect an invention (a creation) and not a discovery, i.e. the simple taking note of a pre-existant [*sic*] reality'.[134]

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131 ibid [6.4.2.1].

132 In *Tomatoes/State of Israel,* inventions are understood as creations, ie reproducible results of a process involving human intervention. These inventions in the sense of creations should be transformed into technical teachings so that they can be disclosed and teach others in the field how to make the inventions (ie the creations). Some scholarship refers to 'accidental inventions', ie 'accidental discoveries, [which] at least at the moment of the serendipitous event, lack conception.' Sean Seymore, 'Serendipity' (2009) 88 NC L Rev 185, 191. However, neither the accidental event of discovering a substance nor the discovered substance amount to an invention in the sense of *Tomatoes/State of Israel.* The 'serendipper' can turn a discovery into an invention by acquiring knowledge about how to re-create it, how to incorporate it into a process with industrial application, etc., see more in the following section.

133 *Tomatoes/State of Israel* (n 116) [6.4.2.3]. This comes from the part of the decision where the EBA interprets the 'essentially biological process' exception to patentability. In sum, (i) if there is a technical step in a process then the process is an invention; (ii) if the technical step in a process which is based on the sexual crossing of plants and on subsequent selection only serves to perform the process steps of the breeding process then such a process is excluded; (ii) if, however, the technical step within such a process determines the result to some extent then the process is outside the exception and bounces back to constitute an invention.

134 Roger Gajac, 'Comparative Study of Substantive Law in Force in the Countries Represented on the Committee of Experts on Patents' EXP/Brev (53) 18 as reproduced in Justine Pila, *The requirement for an invention in patent law* (OUP 2010) 138. The Comparative Study was prepared in 1953 under the auspices of the Council of Europe.

In general, a discovery involves finding and disclosing information about the natural world, including describing properties of a pre-existing matter.[135] A transformation of a discovery into an invention requires 'an act of invention or human ingenuity'.[136] Or, as put by Moufang, a member of the Boards of Appeal, in a more down-to-earth manner, 'a discoverer becomes an inventor when he provides, on the basis of his knowledge, a purposeful instruction to a certain pursuit'.[137] If the discovery concerns a function, its patentability depends on whether this discovery enriched the whole teaching with technical elements or not.[138]

For instance, a discovery that is implemented in a reproducible process may constitute an invention whereas a mere reformulation of a discovery in the form of a technical teaching does not render it patentable.[139] In one case before the EPO, it was emphasized that a mere discovery of a property of a receptor even if it has a pharmacological effect does not suffice to claim a therapeutic invention.[140]

> The discovery on which the invention is based, even if representing an important piece of scientific knowledge, still needs to find a practical application in the form of a defined, real treatment of any pathological condition in order to make a technical contribution to the art and be considered an invention eligible for patent protection.[141]

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135 Simon Thorley and others, *Terrell on the law of patents* (15th edn, Sweet & Maxwell Ltd 2000) [2]-[69] (not included in the 19th edn); Sigrid Sterckx and Julian Cockbain, *Exclusions from patentability: how far has the European Patent Office eroded boundaries* (CUP 2012) 115.

136 Sterckx and Cockbain (n 135) 133.

137 Rainer Moufang, 'Art 52(2) u (3) EPÜ Ausgeschlossene Nicht-Erfindungen / excluded non-inventions' in Rainer Schulte (ed), *Patentgesetz mit Europäischem Übereinkommen* (10th edn, Carl Heymanns Verlag 2017) [75].

138 To put it in the words of the EBA: 'A claim to the use of a known compound for a particular purpose, which is based on a technical effect which is described in the patent, should be interpreted as including that technical effect as a functional technical feature.' *Friction reducing additive*, G 0002/88 of 11 December 1989, EP:BA:1989:G000288.19891211.

139 Mellulis (n 87) 346.

140 *Serotonin receptor/ELI LILLY*, T 0241/95 of 14 June 2000, EP:BA:2000:T024195.20000614, [3.1.2].

141 ibid.

Generally, it is difficult to formulate the required human intervention turning a discovery into an invention in a more specific way than to make the discovery a part of the solution to a problem. But, exceptionally, the required human intervention can be more specific. This is, for instance, the case of biotechnological inventions the making of which, pursuant to the EU Biotechnology Directive, requires an act of isolation of biological material from its natural environment, or its synthetic production.[142]

4.1.2 Teleological Interpretation and Historical Reasons for a Human Intervention

The policy documents which accompanied the amendments of the EPC in 2000 further corroborate the importance of creations under the EPC framework. Prominently, they state that '[t]he new wording of Article 52(1) EPC plainly expresses that patent protection is reserved for creations in the technical field.'[143] This equates inventions with creations. According to the Oxford English Dictionary, the ordinary meanings of 'creation' are (i) 'something created by divine or natural agency' and (ii) 'an original production of human intelligence, power, skill, or art; esp. a work of imagination'.[144]

Filtering out creations by the God and nature for obvious reasons, creations in all technical fields mean products of human intelligence, skill, etc. in all technical fields. The Comparative Study of Substantive Law further emphasises the role of human origin of an invention: 'one can infer from what has been said the rule that the author of a patentable invention must have been presented with a problem and have indicated a solution to it'.[145]

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142 Directive 98/44/EC of 6 July 1998 on the legal protection of biotechnological inventions [1998*]* OJ L 213/13) art 3.

143 Special edition 4/2007 Revision of the European Patent Convention (EPC 2000) Synoptic presentation EPC 1973/2000 – Part I: The Articles Part II Chapter I Article 52 EPC.

144 Oxford English Dictionary Online (*EOD*, December 2020) <https://www.oed.com/> accessed 31 December 2021.

145 Gajac (n 134) 3–7 as found in Pila (n 134) 139.

In a landmark decision *Rote Taube* (pre-dating the EPC 1973), the German Supreme Court affirmed that subject matter should not be treated as non-inventions when they involve a methodical utilization of controllable natural forces and phenomena (not only in the fields of physics, chemistry but also biology) to achieve a causal, perceivable result.[146] The requirement of repeatability of the method and reproducibility of the result were adopted by the EBA in *Tomatoes/State of Israel* to form part of the EBA's interpretation of the notion of 'invention'.

As creations from all technical fields must be treated equally,[147] an identical definition of an invention should apply to subject matter coming from any field of technology. Therefore, the authorities should apply the same standard and have the same task of ascertaining whether a certain subject matter is an invention, including the aspect of its origin. This means asking whether the subject matter constitutes a product of human creative intervention, and thus is attributable to a human being.

4.2 Inventive Step Requirement

For a grant of a European patent, an invention must be inventive in terms of involving an inventive step or activity[148] as well as achieving some progress or advancement of the state of the art.[149] In relation to human inventorship, the requirement for an inventive activity may seem to play a second fiddle to the invention requirement.

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146 *Rote Taube*, Decision of 27 March 1969, X ZB 15/67 [1970] IIC 136, 138. Also see Joseph Straus, 'Biotechnologische Erfindungen - ihr Schutz und seine Grenzen' [1992] GRUR 252, 258.

147 The Agreement on Trade-Related Aspects of Intellectual Property Rights, art 27(1) prohibits discrimination on the grounds of the field of technology.

148 English version: Inventive step, German version: *Erfinderische Tätigkeit* (inventive activity) and French version: *Activité inventive* (inventive activity).

149 A mere disadvantageous modification of the closest prior art does not constitute an inventive step. *()* T 2197/09 of 20 November 2014, EP:BA:2014:T219709.20141120 [5.4].

Nonetheless, this chapter argues that the requirement for an inventive activity reflects human inventorship in requiring a genuine intellectual activity involved in solving the underlying technical problem. This follows from the relevance of features of the invention for the assessment of an inventive step. Where an invention consists of both technical and non-technical features, the inventive step is assessed only in respect of those features that contribute to the solution of the technical problem by providing a technical effect[150] (or a further technical effect in case of computer implemented methods). Hence, the necessary intellectual activity[151] should be involved directly in solving a technical problem and thus be reflected in those features which contribute to the solution.[152]

Further, the required activity is intended to be of human origin because it is benchmarked against a hypothetical decision-making and acts of a notional natural person, the person skilled in the art (PSA). The PSA is a notional expert (or a team of experts) in the technical field of the invention[153] who has common general knowledge, has read all publicly available documents, knows publicly available uses of the technology, understands all languages,[154] and possesses the necessary equipment and technical tools which vary according to the technical field. This person is conservative[155] and unimaginative and

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150 *Two identities/COMVIK*, T 0641/00 of 26 September 2002, EP:BA:2002:T064100.20020926 [6]. *Estimating sales* (n 117) [5 e)]. This was embraced by the EBA in *Simulation Method* (n 124) [125] re computer-implemented mathematical models or algorithms.

151 As acknowledged elsewhere, 'while the exercise of (mental) labour and effort is a necessary condition for an invention to be non-obvious, it is not a sufficient condition.' Bently and others (n 29) 591.

152 Naturally, there are many ways in which one comes up with a solution to a technical problem. Some may start from a pre-defined technical problem and devise a solution to it. This will be typical for solutions suggested by AI-driven systems. Others may start with finding an object and then devising its purpose or implementation to solve technical problems. See EPO, *Guidelines* (2021), Part G, Chapter VII [9].

153 Philip Johnson, 'EPC 2000, Art 56' in Richard J Hacon and Jochen Pagenberg (eds), *Concise European patent law* (2nd edn, Kluwer Law International 2008) 52.

154 *Combustion engine*, T 0426/88 of 9 November 1990, EP:BA:1990:T042688.19901109, [6.4].

155 *Genentech/Expression in yeast*, T 445/91 of 20 June 1994, EP:BA:1994:T045591.19940620, [5.1.3.3].

therefore they would miss every step that goes beyond ordinary good practice and routine. In this respect, the PSA standard works similarly to other legal standards of notional persons, such as ‘reasonable person’ or ‘average consumer’.

If negligence is to be determined with the aid of a reasonable person standard, it is commonly understood that it is human negligence that is in consideration. Therefore, it seems plausible to conclude that if something is to be determined by reference to a person skilled in the art standard, that something is a human activity of a similar nature and under similar circumstances as the standard. The standard applies in the same manner as other standards, just in the negative: what a PSA would not have done. (This will be discussed in more detail in the following chapter.) Lastly, the required activity is understood as being of human origin because it is referred to as ‘intellectual’ in the EPC drafting documents, see below.

4.2.1 Teleological Interpretation and Historical Reasons for a Human Inventive Step

Contrary to the conventional approach which is predominantly focused on inventiveness as a property of an invention, here the interpretation of the requirement begins with the literal meaning of the notion of ‘inventive activity’ and its purpose. As a treaty of international public law, the EPC must be interpreted ‘in good faith in accordance with the ordinary meaning to be given to the terms of the treaty in their context and in the light of its object and purpose’.[156] Therefore, the terms of ‘inventive step’ or ‘inventive activity’ shall be given their ordinary meaning of inventive (intellectual) step or activity. Hence, the activity

[156] Vienna Convention on the Law of Treaties 1969, art 31.

that is required to be involved in devising an invention under Article 52(1) and Article 56 of the EPC means (i) a genuine intellectual activity that is (ii) of a certain quality.

Under the heading 'creative effort', the Comparative Study of Substantive Law references a requirement that 'the invention should represent a manifestation of intelligence which appreciably exceeds the normal train of thought of which any specialist in art would be capable'.[157] Kühnemann's report to which the EPC travaux préparatoires refer as well, formulates 'the requirement of creative effort in an indirect manner so that a realisation of a subject matter that was within the reach of an average expert was excluded from patentability'.[158]

Additionally, a German delegate to the Patents Working Party expressed the view that 'under German law, the concept of *Erfindungshöhe* [inventive level] did not necessarily involve creative effort (flash of genius) on the part of the inventor. It was enough if he broke new ground and applied some intellectual activity.'[159] Further, Kurt Haertel, referred to as the 'father of the European patent law'[160] in his study of 1960 writes that while the delegates drafting the EPC 1973 were not able to agree on whether patentability should depend on the conception of progress in the art or inventive level, they agreed on 'an explicit formulation of how to evaluate the inventive performance'.[161]

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157 Gajac (n 134) 16, copy on file with author.

158 Herbert Kühnemann, 'Report on Technological Progress and Creative Effort as Patentability Criteria' EXP/BRev (60) 5 <https://rm.coe.int/090000168072965b> accessed 29 March 2021.

159 Proceedings of the 1st meeting of the Patents Working Party held at Brussels from 17 to 28 April 1961, Document IV/2767/61-E p 18, <https://www.epo.org/law-practice/legal-texts/epc/archive/epc-1973/traveaux.html> accessed 29 March 2021.

160 The website of the City of Munich, 'Kurt-Haertel-Passage' (*muenchen*, 2003) <https://www.muenchen.de/rathaus/Stadtverwaltung/Kommunalreferat/geodatenservice/strassennamen/Strassenneubenennung-2003/kurthaertelpassage.html> accessed 2 December 2021.

161 Kurt Haertl, *Study on the fundamental problems of the creation of a European patent which stands next to the national patents* (Bonn 1960) 27.

There is an observable tension inherent in these accounts. On one hand, an involvement of inventor's genuine intellectual activity in the process of devising an invention is both presupposed and required. Requiring a genuine intellectual activity is also aligned with the purpose of patent systems as laid out in justificatory theories (see further below). On the other hand, when it comes to the inventive quality of the activity and how to prove it, there is a reluctance to define it in positive terms.

As a result, Article 56 of the EPC provides for a legal presumption of inventive activity: '[a]n invention shall be considered as involving an inventive step if, having regard to the state of the art, it is not obvious to a person skilled in the art.' Hence, inventiveness is measured according to an objective standard of an average expert and a hypothetical of what would have been within their reach. In effect, to make an inventive invention, an inventor is required to do what an average expert would not have done.

The view presented here does not suggest subjectivity, it merely alerts to the fact that historically a genuine human intellectual activity has been presupposed and that this activity ought to be of inventive quality which is to be measured objectively.

4.2.2 Typology of Inventive Activities

Though officially the actual activity of an inventor is not taken into consideration by the EPO's examiners, this does not necessarily mean that the EPO does not conceive of the inventive activity as genuinely human and related to the concepts of inventor and invention. The EPO Guidelines for Examination state that

> in order to assess whether an inventive step is present it is important for the examiner to bear in mind that an invention may, for example, be based on the following: the devising of a solution to a known problem […or] the arrival at an insight into the cause of an observed phenomenon (the practical use of this phenomenon then being obvious).[162]

[162] EPO Guidelines (n 152) [9].

Similarly, despite the proclaimed disregard for the way the inventor made their invention or inventor's subjective assessment of their efforts,[163] the UK courts consider so-called secondary evidence relating to the contemporaneous events, reactions to the invention, the realities surrounding making the particular invention and actual ways of approaching the particular technical problem undertaken at the time of the invention.[164] Telling the actual story of an inventor devising the invention can be favourable to the patentee.[165]

Moreover, the German and French application practices yield a typology of inventive activities. The activities of overcoming technical obstacles, answering a series of objectively difficult questions,[166] reversing a bias, misleading belief or technical stereotype,[167] surprising a PSA,[168] making a selection from among a great number of possible solutions or combining at least three documents of prior art[169] are all indicating inventive activity.

During the EPC drafting negotiations, in reaction to a Swiss proposal to allow applicants' evidence that they have made progress in the art, Kurt Haertel, President of the German Patent Office and the Chair of the Main Committee I at the Munich Diplomatic Conference commented that 'it had not proved possible to find a better definition than that given in Article 54 of the theoretically objective concept of inventive step, in respect of

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163 *Nichia Corporation v Argos* [2007] EWCA Civ 741 [2007] Bus LR 1753 [13].

164 A list of secondary factors was provided by Justice Laddie in *Haberman v Jackel Intl Ltd* [1999] FSR 683, 699–701.

165 *Actavis v ICOS* (n 115) [71]. *Positec Power Tools (Europe) Ltd v Husqvarna AB Chancery Division* [2016] EWHC 1061 (Pat), [2016] Bus LR 714 [8].

166 Alfred Keukenschrijver, '§ 4 Erfinderische Tätigkeit' in Rudolf Busse and Alfred Keukenschrijver (eds), *Patentgesetz* (de Gruyter 2016) [116].

167 ibid [48]–[49]. Cour de cassation, Decision of 19 December 2000, PIBD 2001 721 III 277.

168 *Disiloxan*, Decision of 27 February 1969, X ZB 11/68 [1969] GRUR 265, 266.

169 All in Institut national de la propriété industrielle, *La délivrance des brevets et des certificats d'utilité* (INPI 2016) 95.

which, however, subjective elements also played a part in practice'.[170] This account as well as the practice of courts recognize that when the inventiveness is uncertain, the evidence on subjective elements of the inventive activity is acceptable. These examples also reveal that although the objective standard of a PSA is in place and is irreplaceable, it is not strange to the authorities to think of the inventive step or inventive activity as an actual intellectual activity or step which led to devising of the invention.

[170] Travaux préparatoires to the EPC 1973, Volume 42 E, EPO, Munich 1999, M/PR/K/I [82].

5 HUMAN INVENTORSHIP: A BRIEF LOOK ACROSS THE ATLANTIC

Since many of the ideas and proposals presented above may be seen as controversial, this section demonstrates that European patent law is not alone with its assumptions on human inventorship and requirement of human creative activity. It offers a brief look at the situation in the US patent law and observes a striking similarity in terms of importance of human creative activity for patentability.

Human creative activity emerges as an implicit patentability requirement in the US patent law too. A prominent example is the landmark case of *Diamond v Chakrabarty* where the US Supreme Court held that patentability is confined to objects created by man which have 'the potential for significant utility [… and whose] discovery is not nature's handiwork, but his own'.[171] The US Supreme Court clearly acknowledged the existence of a separate requirement for potential for utility, and a separate requirement for an invention devised by human creative work.

Another landmark decision is *Association for Molecular Pathology (AMP) v Myriad Genetics Inc* Initially, the Federal Circuit ruled in favour of patentability of isolated genes on the ground that 'BRCA1 and BRCA2 [genes] in their isolated states are different molecules from DNA that exists in the body'.[172] In the opinion of the Federal Circuit, producing a non-naturally occurring substance, such as isolated genes, made the resulting substance patent eligible.

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171 *Diamond v Chakrabarty*, 100 S Ct 2204, 2208, 65 L Ed 2d 144 (1980) 310.

172 *Association for Molecular Pathology v Myriad Genetics, Inc* 689 F3d 1303 (Fed Cir 2012) 1328.

However, this was overruled by the US Supreme Court. Since the patentee 'did not create or alter any of the genetic information encoded in the BRCA1 and BRCA2 genes'[173] they did not bring forward anything which could possibly merit a patent. In contrast to the isolated BRCA1 and BRCA2 genes, a synthetic cDNA sequence was found patent eligible as the process by which it was devised involved the 'creation of a cDNA sequence from mRNA'[174]. The patent eligibility of cDNA was further supported by reference to *Diamond v Chakrabarty* where the modified bacterium was found patent eligible by virtue of being 'a product of human ingenuity'.[175]

The US Supreme Court went even further by stating that '[t]he possibility an unusual and rare phenomenon might randomly create a molecule similar to one created synthetically through human ingenuity does not render a composition of matter nonpatentable.'[176] In other words, even objects created synthetically through human ingenuity which happen to have the same chemical composition as a naturally occurring substance can qualify for patent eligible subject matter. Thereby, human ingenuity trumps distinctiveness and is recognised as the key requirement for the existence of patent eligible subject matter.

Diamond v Chakrabarty and *AMP v Myriad Genetics*, read in conjunction, effectively distinguish between the process of providing access to a non-naturally occurring substance (the isolation of genes from natural DNA) and the process of creating a non-naturally occurring substance (the synthetic making of cDNA or bacterium). Most importantly, only the substances resulting from the latter process are patent eligible because only the devising of those substances involves human creative activity.

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173 *Association for Molecular Pathology (AMP) v Myriad Genetics Inc*, 133 S Ct 2107 (2013) 2116.

174 ibid 2119.

175 ibid 2217.

176 ibid 2119 fn 8.

6 CONCLUSION

This chapter observes that the origin of an invention matters for its patentability in European patent law. The brief excursion to the US patent law reveals that also non-European authorities find the origin of a subject matter and the activity underlying its coming into being as relevant for the patentability assessment.

Although the objective set out for this chapter, namely identification of human inventorship and human aspects in the current EPC patentability criteria, was achieved, it need to be acknowledged that it does not render a crystal-clear conception of human inventorship. Nonetheless, if the requirements for an invention and inventive activity are read in the light of their purpose and the underlying factual assumptions it follows that a subject matter must constitute a creation involving inventive activity. To meet the requirement for an invention, a subject matter must be a result of a human intervention which intervention directly and causally determines its technical elements. To meet the requirement for an inventive activity, a subject matter must constitute a result of a genuine intellectual activity expended on solving a technical problem in a manner that makes the invention inaccessible to an average expert.

Furthermore, to clarify the concept of human inventorship from the perspective of the national rules on inventorship for entitlement purposes, it is argued that the necessary human creative intervention and human intellectual activity of inventive quality must be poured into the process of devising (the UK), making (Germany) or conceiving (France) the invention. The process of inventing is construed narrowly, and its boundaries are demarcated by the process of coming up with the inventive concept (UK), complete solving a specific, concrete technical problem, including the disclosure of the teaching (Germany) and formulating the idea which forms the essence of the invention without necessarily completing the invention (France). Alternatively, to put it from the inventor's angle,

inventorship can be claimed by a person who originated those technical elements of the invention that imply inventive activity.

The proposed formulations should clarify the concept of inventorship, ie what it means to invent and become an inventor, in the selected jurisdictions. Consequently, a subject matter that is not a result of the required human creative intervention and human intellectual activity of inventive quality cannot be readily accommodated by the EPC system without compromising the system's theoretical basis, foundational factual assumptions and rules on entitlement and designation of the inventor.

CHAPTER IV.

INVENTORSHIP IN THE APPLICATION PRACTICE IN THE SELECTED JURISDICTIONS

1 INTRODUCTION

Similarly to the previous chapter, the aim of the present chapter is to look for reflections of human inventorship in the national patentability criteria. Since the national patentability criteria are modelled on the European Patent Convention ('EPC')[1] criteria and the national patent offices and courts are bound to follow the interpretation of those criteria given by the European Patent Office ('EPO'), the differences across the selected jurisdictions may be marginal.[2]

Despite the expectations of a high degree of uniformity in the epistemic approaches, this chapter observes differences in national authorities' treatment of the requirement for an invention, especially with respect to computer-implemented methods in Germany and in the UK. The national approaches to the inventive step assessment differ, too, namely as to the relevance of factual circumstances and to what extent the assessment is a matter of law or facts. Further, this chapter explores the historical roots of the invention and inventive activity requirements in the selected jurisdictions and conducts an inquiry into whether they reflected the human aspect of inventing in the pre-EPC 1973 era more clearly than nowadays.

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1 Convention on the Grant of European Patents (European Patent Convention) of 5 October 1973 as revised by the Act revising Article 63 EPC of 17 December 1991 and the Act revising the EPC of 29 November 2000.

2 The settled jurisprudence of the EPO on the interpretation of the EPC should normally be followed. *Actavis Group PTC EHF v ICOS Corporation* [2019] UKSC 15, [2019] Bus LR 1318 [56].

This chapter also finds that despite the human inventorship reflections in the invention and inventive step criteria in the EBA's case law (Chapter II.) and national states' traditions (below), the currently employed epistemic approaches to the criteria are not sensitive enough to detect the human aspects of inventing. This chapter also sheds light on the interpretative routes which led to diminishing of the significance of the human origin.

If the conclusions of the previous chapter are accepted and patentability depends on whether the necessary human creative intervention and human intellectual activity of inventive quality were indeed poured into the activity of devising (the UK), making (Germany) or conceiving (France) the inventive concept or the essence of invention, then the authorities should examine how the subject matter at hand came into being. Absent such an examination, the inventive technical solutions without a human inventor can hardly be distinguished from human-devised inventions.

2 EPISTEMIC APPROACHES TO THE INVENTION REQUIREMENT

2.1 European Patent Office

The criterion of an 'invention' is a self-standing patentability requirement under the EPC[3] and any subject matter must first qualify for an invention in order to be granted a patent. In addition, Article 52(2) of the EPC contains a non-exhaustive list of categories of subject matter that are excluded from patentability as non-inventions.[4] This list may also be read

[3] *Estimating sales activity/DUNS LICENSING ASSOCIATES*, T 0154/04 of 15 November 2006, EP:BA:2006:T015404.20061115 [5].

[4] These include a discovery, scientific theory or mathematical method, aesthetic creations, a scheme, rule or method for performing a mental act, playing a game or doing business, or a program for a computer or the presentation of information.

as a 'negative definition of the notion of invention.'[5] What the listed categories have in common is that they comprise objects which are deprived of any technical character.

However, where an object is not limited to an excluded subject matter as such, but it is only directed to an excluded subject matter, it can still qualify for an invention provided its technical character is demonstrated.[6] Through this interpretative route (via the negative definition of an invention), the requirement for an invention became transformed into a 'requirement of technicality'[7] (or technicity).

In practice, when examining whether the requirement for an invention is fulfilled, the Boards of Appeal (Boards) look at whether an object has a technical character. Over time, the Boards developed a test for a technical character which plays the role of the invention test. The case law can be summarised as the Boards looking for a technical character which is to be proven by demonstrating an object which (i) involves technical means, (ii) produces a technical result or (iii) involves a technical field of human activity.[8]

Alternatively, the Boards ask whether the resulting object 'provides a tangible technical effect, such as the provision of a physical entity as the resulting product or a non-abstract activity, such as through the use of technical means'.[9] Clearly, the invention test in the form of the technical character test is unlikely to detect a lack of human creative intervention involved in devising of the subject matter. The guidance given by the EBA

5 *Estimating sales* (n 3) [8].

6 *Odour selection/QUEST INTERNATIONAL*, T 0619/02 of 22 March 2006, EP:BA:2006:T061902.20060322 [2.2].

7 *Estimating sales* (n 3) [5 b].

8 ibid. Similarly, 'where an intrinsically non-technical solution (mathematical algorithm) seeks to derive a technical character from the problem solved, the problem must be technical'. *Classification method/COMPTEL*, T 1784/06 of 21 September 2012, EP:BA:2012:T178406.20120921 [2.3].

9 *()*, T 0914/02 of 12 July 2005, EP:BA:2005:T091402.20050712 [2.3.6].

Tomatoes/State of Israel[10] that the required technicity is predicated on a human creative intervention tends not to be applied by the Boards.

In summary, under the EPO's invention test, the inquiry is reduced to a quest for a technical character of an object as specified in the patent application. The prerequisite for the technical character, a human creative intervention in order to bring about a resulting object, seems to have been put to test only in the context of biotechnology (*Tomatoes/State of Israel*)[11] and, more recently mentioned in the context of computer-implemented methods (*Simulation method*).[12] As creations from all technical fields must be treated equally,[13] the test for a human creative intervention should apply to objects stemming from all technology sectors.

2.2 United Kingdom

Terrel on the Law of Patents of 1965, ie before the EPC 1973 entered into force and the Patents Act 1977 implemented the EPC patentability criteria, defines an invention as 'any manner of new manufacture […] and any new method or process of testing applicable to the improvement or control of manufacture.'[14] In this connection, *Reynolds v Herbert Smith & Co., Ltd* is cited:

> Discovery adds to the amount of human knowledge, but it does so only…by disclosing something… Invention also adds to human knowledge, but not merely by disclosing something. Invention necessarily involves also the suggestion of an act to be done, and it must be an act which results in a new product, or a new result,

[10] The case was discussed in more detail in Chapter II. Here the decision is analysed from the perspective of defining the invention through technical character and human intervention without going into detail what the human intervention entails.

[11] *Tomatoes/State of Israel*, G 0001/08 of 9 December 2010, EP:BA:2010:G000108.20101209.

[12] *Simulation Method*, G 0001/19 of 10 March 2021, EP:BA:2021:G000119.20210310.

[13] The Agreement on Trade-Related Aspects of Intellectual Property Rights, art 27(1) prohibits discrimination on the basis of the field of technology.

[14] Guy Aldous, Douglas Falconer and William Aldous, *Terrell on the Law of Patents* (11th edn, Sweet & Maxwell 1965) [9].

> or a new process, or a new combination for producing an old product or an old result.[15]

One can turn a discovery into an invention if one 'can describe a method of utilising that principle so as to make it applicable to the production of a new manufacture.'[16]

The Banks Committee established to report on the state of the patent system and patent law which also made proposals for the coming Patents Act 1977 expressed unwillingness to define the new concept of invention in the new patents act, replacing the term of new manner of manufacture.[17] This is how the state of affairs concerning the concept of invention remained until today.

No positive definition of an invention is recognised by courts.[18] In the view of Lord Hoffmann, the novelty, inventive step and industrial applicability criteria, when taken in conjunction, probably amount to an invention, unless the grant of a patent for it is excluded.[19] He also added: 'I say probably, because in the absence of a definition one cannot say with certainty that one might not come across something which satisfied all the conditions but could not be described as an invention'.[20] At the end of his invention assessment, he stated that '[j]udges would therefore be well advised to put on one side their intuitive sense of what constitutes an invention until they have considered the questions of novelty, inventiveness and so forth'.[21]

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15 *Reynolds v Herbert Smith & Co, Ltd,* 20 RPC 123, 126 as cited in Aldous, Falconer and Aldous (n 14) [48].

16 ibid [49].

17 Maurice Banks, *The British Patent System* (Her Majesty's Stationery Office 1970) Cmnd 4407, 64.

18 Colin Birss and others, *Terrell on the Law of Patents* (18th edn, Sweet & Maxwell 2016) 29.

19 *Biogen Inc v Medeva Plc* [1996] UKHL 18, [1997] RPC 1, 41-42.

20 ibid.

21 ibid.

Accordingly, in practice, the UK courts address, besides the secondary patentability criteria, only the 'negative definition' of the invention. They ask whether the alleged invention in question falls within any of the excluded subject matters categories under Section 1(2) Patents Act 1977.[22] An object is considered not to be excluded from patentability if the contribution contained therein is 'actually technical in nature'.[23] In case of computer-implemented inventions, in relation to which this question was repeatedly discussed, the required technicity is to be established on the basis of whether the invention produces a relevant technical effect which, in turn, depends on the facts of each case.[24]

For instance, in *HTC Europe v Apple*, it was found that 'a method of dividing up the screen of such a device into views and configuring each view as a multi-touch view or a single-touch view using flags with a specific functionality' makes a technical contribution, its embodiment in software notwithstanding, as it 'presents a new and improved interface to application programmers, […] and makes it easier for them to write application software for the multi-touch device'.[25]

From this it follows that, in contrast to the EPO's practice, the patentability quest in the UK does not begin with the invention requirement but rather it is closed by it, if at all. Neither is there any specific inquiry into the relationship between an inventor and an invention which is envisaged by virtue of Patents Act 1977 s. 7(3).[26] In circumstances where an object is directed to an excluded subject matter, the inquiry is focused on whether an object makes a technical contribution to the state of the art. At the end of the day, this

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22 These categories are the same as the ones under Article 52(2) of the EPC.

23 *Aerotel Ltd and Telco Holdings Ltd* [2006] EWCA Civ 1371, [2007] Bus LR 634 [40].

24 *Gemstar-TV Guide International Inc v Virgin Media Ltd* [2009] EWHC 3068 (Ch), [2010] RPC 10 [41]-[43], *AT&T Knowledge v Comptroller General of Patents* [2009] EWHC 343, [2009] Bus LR D51 [39]-[41], *HTC Europe Co Ltd v Apple Inc* [2013] EWCA Civ 451, [2013] RPC 30 [154].

25 *HTC Europe* (n 24) [57]–[59].

26 '[…] "inventor" in relation to an invention means the actual deviser of the invention […]'.

invention test is reduced to a set of technical questions of fact such as what type of improvement of what type of software (eg a contribution at the level of operating system) counts as an improvement of the hardware (the device).[27]

2.3 France

A historical commentary to the French patent law of 8 July 1844 lists only two requirements for patentability and those were novelty and an invention. In the context of that statute, an invention was perceived as 'a scheme, a creation of intelligence [… and this means …] a process or product containing an industrial idea.'[28] Professor Roubier understood an invention in terms of an activity resulting in a product and thus in contrast with an unpatentable discovery: '[i]n the invention itself, the activity of a human is productive, in the discovery, [the activity] is, so to say, receiving […] what must be rewarded are the arrangements of human activity and not what the nature produced on its own'.[29]

More modern French scholarship, too, juxtaposes an invention and a discovery. Professors Azéma and Galloux comment that 'invention is first a creation which means it needs a separation from an individual who has conceived it and an action on the real world; it fundamentally distinguishes itself from the discovery which is only an apprehension of the real world.'[30] For Paul Mathély an invention is 'every action or endeavour of a human

27 See *HTC Europe* (n 24) [154]ff.

28 Etienne Blanc, *L'inventeur breveté, code des inventions et des perfectionnements* (3th edn, Cosse 1852) 254.

29 Paul Roubier, *Le droit de la propriété industrielle*, vol 2 (Recueil Sirey 1954) 90.

30 Jaques Azéma and Jean-Christophe Galloux, *Droit de la propriété industrielle* (7th edn, Dalloz 2012) 132.

to shape and utilise the nature and the matter'[31] and thus is predicated upon a human creative intervention.

Current French law treats the requirement for an invention as a 'true, positive and autonomous requirement'[32] which is separate from the secondary patentability requirements and excluded subject matter categories. However, as reported in the legal scholarship, French courts 'do not take it into consideration, at least explicitly'.[33]

Interpretation of the requirement for an invention underwent a similar development as at the EPO level and it became framed as a requirement for a technical character. Consequently, French courts adopted invention tests mirroring those applied by the Boards. Hence, the invention is understood as a technical solution to a technical problem. This means that an object neither utilising technical means nor solving a technical problem does not amount to an invention.[34]

Noteworthy, the shift from an invention to a technical character may cause a semantic overlap with the secondary patentability requirement for an industrial character. 'The ancient condition of industrial character may cover not only the modern requirement for industrial applicability but also the one for invention [as in the past] industrial meant to produce technical goods or results'.[35] As this legacy interacts with the current interpretation of an invention, the invention test, if reduced to looking solely for the technical character, and the test for industrial applicability may conflate into one. Consequently, this may lead

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31 Jerome Passa, *Droit de la propriété industrielle* (2nd edn, LDGJ 2013) 74 quoting Paul Mathély, 'Le nouveau régime des brevets d'invention' (1969) Ann prop ind p 1.

32 ibid 68.

33 Fréderic Pollaud-Dulian, *La propriété industrielle* (2nd edn, ECONOMICA 2011) [159].

34 Passa (n 31) 70.

35 Jacques Azéma and Jean-Christophe Galloux, *Droit de la propriété industrielle* (8th edn, Dalloz 2017) 158-59.

to finding an object to lack industrial applicability, whereas it would have been more coherent to find that object to fail to meet the requirement for an invention.[36]

In summary, even though historically the French saw a human creative activity behind the invention, in more modern times the technical character has become a convenient proxy for the requirement for an invention. Hence, under the current invention test which follows the EPO's approach, the French courts search for a technical character or technicity rather than human creativity which is necessary to produce it. Moreover, given the specifics of the French context, the invention test may happen to check for the same issues as the test for industrial applicability, i.e. for a technical application, which renders one of the tests redundant.

2.4 Germany

The definition of an invention as a 'teaching of technical content wherein technology depends upon the doctrines of physics and chemistry'[37] originates in a German landmark decision *Rote Taube* of 1969. Therein, the German Supreme Court reiterated that objects should not be seen as non-inventions, provided they involve a methodical utilization of controllable natural forces to achieve a causal, perceivable result, including (not only physics and chemistry but also) biological natural forces and phenomena.[38]

As the development of the German cases shows, *Rote Taube* has been overcome in some respects. Foremost, the concept of the invention has been overshadowed by the requirement for 'technicity' which is understood as a 'solution serving to solve a concrete

36 Passa (n 31) 68-69.

37 *Rote Taube*, Decision of 27 March 1969, X ZB 15/67 [1970] IIC 136, 138.

38 ibid.

technical problem with technical means'.[39] As a result, an object is found to an invention if it provides such a solution through technical means, or, if it is 'characterised by a piece of knowledge that is based on technical considerations'.[40] What makes some considerations technical or what types of problem can be characterised as technical remains unclear, leaving the contours of the notion of 'technicity' or 'technical' unrefined.

Case law as well as legal scholarship submit that this may be so by design. Since the concept of the technicity ('*Technikbegriff*') is dynamic[41] and open to assessment[42] it can accommodate objects lying in all future branches of the traditional technical fields.[43] 'The definition of the term technicity, and thereby an invention in its patent law sense, must leave room for inclusion of the future developments.'[44] Recently, this potential was realised when the German Supreme Court extended the scope of patentable objects beyond the traditional technical fields of physics, chemistry and biotechnology[45] to cover also the technical field of data processing, storing and transmission.[46]

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39 *Steuerungseinrichtung für Untersuchungsmodalitäten,* Decision of 20 January 2009, X ZB 22/07 [2009] GRUR 479 [11].

40 '[D]*urch eine Erkenntnis geprägt ist, die auf technischen Überlegungen beruht*'. *Logikverifikation*, Decision of 13 December 1999, X ZB 11/98 [2000] GRUR 498, 500.

41 ibid.

42 '[…p]*atentrechtliche Technikbegriff als abwägungsoffenes Merkmal zu verstehen sei* […]'. Herbert Zech, 'Technizität im Patentrecht –Eine intra- und interdisziplinäre Analyse des Technikbegriffs' (*ssrn,* 6 November 2017) 11 <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3063183> accessed 7 May 2020.

43 Ralph Nack, 'Inventions and their amenability to patent protection' in Maximilian Haedicke and Henrik Timmann (eds), *Patent law: a handbook on European and German patent law* (CH Beck 2014) [13].

44 Klaus Bacher, 'PatG § 1 [Voraussetzungen der Erteilung]' in Georg Benkard (ed), *Patentgesetz* (CH Beck 2015) [46].

45 Joseph Straus, 'Biotechnologische Erfindungen - ihr Schutz und seine Grenzen' [1992] GRUR 252, 258.

46 In one case the required technicity was acknowledged because the claimed process run on computer involved 'typical steps of processing, storing and transmission of data via technical devices'. *Erfindungen mit Bezug zu Geräten und Computerprogrammen*, Decision of 24 February 2011, X ZR 121/09 [2011] GRUR 610, 612. Also, in an earlier case, the underlying computer program was found inherently patentable as it fulfilled the technicity criterion by virtue of serving to processing, storing and transmission of data via a technical device. *Steuerungseinrichtung* (n 39) 480.

This means that German courts, similarly to the Boards, look for a technical character. In some cases (in particular those involving computer-implemented methods), in order to establish a technical character, it suffices to identify a single technical feature in the underlying object.[47] For instance, in *Logikverifikation*, a process for hierarchical logic-verification of high integrated switches was found to be an invention because not only (i) the development and design of the particular computer program made the necessary technical considerations available to experts in the field, but also (ii) the technical concept lied in the technical field of chips production and, as a result, (iii) made those chips lighter which was found to be the technical effect.[48]

Among the aspects of technical character, the scholarship lists causality. The use of natural forces must be causally linked with the desired result (*Rote Taube*). What more, the technical teaching must lead to the result 'immediately', that is without any intermediary activity of persons.[49] According to Bacher, the current presiding judge of the German Supreme Court, the difference between a technical and non-technical teaching depends on whether 'the desired result is an immediate result of the human (intellectual) activity or whether it was caused only by one of those controlled and tamed natural forces'.[50]

Contrary to Bacher, Moufang writes that this requirement of causal link has been overcome in *Logikverifikation* too.[51] Therein, the German Supreme Court found that the doctrine is not against a teaching that 'does not aim at achieving a causal, foreseen result

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47 *Dynamische Dokumentengenerierung*, Decision of 22 April 2010, Xa ZB 20/08 [2010] GRUR 613, 616.

48 *Logikverifikation* (n 40) 501. The importance of the required technical considerations involved in the working of the invention is also mentioned by Rainer Moufang, 'Patentfähige Erfindungen / patentable inventions Art 52 EPÜ, § 1' in Rainer Schulte (ed), *Patentgesetz mit Europäischem Patentübereinkommen* (Carl Heymanns Verlag 2017) [22].

49 *Antiblockiersystem*, Decision of 13 May 1980, X ZB 19/78 [1980] GRUR 849, 850.

50 Bacher (n 44) [50a].

51 Moufang (n 48) [20].

that is brought about due to the utilization of natural forces immediately without any [intermediate, further] interference by human mental activity'.[52] It would be interesting to see whether this would apply analogously to an interference by artificial intelligence activity.

In German patent law, as in French and at the EPC level, the invention can be defined vis-à-vis a discovery. The German account of the distinction between these two hinges on the relevant activity:

> "[i]nvention" and "discovery" each describe the product of a particular human activity, that of discovering and that of inventing. These two forms [discovery and invention], therefore, simply mean 'what is discovered' and 'what is invented' and primarily indicate the nature of activity that leads to this acquisition of knowledge.[53]

To summarise, even though in German patent law humans are traditionally regarded as being the first and primary cause of setting forces of nature into movement and thus creating an invention,[54] neither human creativity nor the process of devising an invention are a factor in the invention assessment. In line with *Rote Taube*, the courts ask whether the object in question possesses the required qualities of being reproducible and having a direct result and utility.[55] Otherwise, the invention test is limited to a search for a technical character or technicity. The courts ask whether the object lies within a technical field, whether it is based on technical considerations or whether it produces a technical effect. In its minimalistic form, the test is satisfied if the object comprises a technical feature and a feature is deemed technical as long as it relates to a technical field.

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52 *Logikverifikation* (n 40) 501.

53 However, further in the text Nack does not connect this activity-based distinction with patentability of a subject matter. Nack (n 43) [149].

54 Nack (n 43) [15].

55 For the required qualities see Bacher (n 44) [70]ff.

Eventually, this means that the requirement for an 'invention in all technical fields'[56] merges the two definitional elements of (i) invention and (ii) lying in any of the technical fields into a single concept of the 'technicity'. Hence, any object that relates to a technical field is deemed an invention. This approach ignores the possibility of an object falling within a technical field, which is not an invention (due to a lack of human creativity for example). As last but not least, this approach reduces the question of law of what the legal notion 'invention' entails into a question of fact of whether the underlying object lies within any of the technical fields recognised as such by the German Supreme Court.

3 EPISTEMIC APPROACHES TO THE INVENTIVE STEP REQUIREMENT

Once authorities establish that a subject matter constitutes an invention, they check whether the other, secondary, patentability requirements are fulfilled in order to grant, or, in case of courts invalidate, a patent. One of these requirements is an involvement of an inventive step which signifies an advancement of the state of the art[57] embedded in the invention. Pursuant to Article 56 EPC, an invention 'shall be considered as involving an inventive step if, having regard to the state of the art, it is not obvious to a person skilled in the art'. It is noteworthy that the definition of an invention involving an inventive step is already framed as an inventive step test.

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56 *Patentgesetz* of 16 December 1980 (BGBl. 1981 I S. 1) ('German Patent Act') §1(1).

57 A mere disadvantageous modification of the closest prior art does not constitute an inventive step. *()*, T 2197/09 of 20 November 2014, EP:BA:2014:T219709.20141120 [5.4].

3.1 European Patent Office

In practice, the Boards use a so-called problem-and-solution test, comprising of the following steps: 'determining the "closest prior art", defining the "objective technical problem" to be solved, and assessing whether or not the claimed invention, starting from the closest prior art and the objective technical problem, would have been obvious to the skilled person'.[58] Thereby, the outcomes of this test depend heavily on how the concepts of (i) the closest prior art[59], (ii) a person skilled in the art and (iii) obviousness are construed. To some extent, these terms have been clarified, yet they remain to be a matter of judgment.[60]

As mentioned in the previous chapter, the inventive step is assessed only in relation to the technical features of the claimed invention, ie features contributing to the technical character of the invention.[61] In the words of one of the Boards of Appeal, 'where a feature cannot be considered as contributing to the solution of any technical problem by providing a technical effect it has no significance for the purpose of assessing inventive step'.[62] Hence, it follows that such a non-technical feature should not be included in the inventive step assessment at all.

The closest prior art does not have to be addressed at any length here because it is a mere body of knowledge and as such it does not contain any human aspects of creation. Information forms part of the prior art of it is made available to the public in such a detail

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58 European Patent Office, *Guidelines for Examination* (EPO 2021), Part G, Chapter VII [5].

59 The closest prior art relates to the state of the art which is to be understood as information that are relevant to a certain field of technology. As this element does not have any direct link to human creativity being involved in devising an invention, it is not discussed here in any detail.

60 *Alcan/Aluminium Alloys*, T 465/92 of 14 October 1994, EP:BA:1994:T046592.19941014 [9.6].

61 *Estimating sales activity* (n 3) [5] e).

62 *Two identities/COMVIK*, T 0641/00 of 26 September 2002, EP:BA:2002:T064100.20020926 [6].

that a person skilled in the art can, at the relevant date, work the technical teaching.[63] The closest prior art is information that is 'directed to a similar purpose or effect as the invention or at least belong to the same or a closely related technical field as the claimed invention'.[64]

To reiterate from the previous chapter, the person skilled in the art (PSA) is a notional expert in the technical field of the invention who has common general knowledge, has read all publicly available documents, knows publicly available uses of the technology, understands all languages[65], and possesses the necessary equipment and technical tools which vary according to the technical field. This person is conservative[66] and unimaginative and therefore they would miss every step that goes beyond ordinary good practice and routine.

An inventive step is found where the state of the art does not suggest the PSA to take the necessary steps from the prior art towards the claimed invention.[67] Or, put differently, the invention seems obvious to the PSA whenever they see a continuity of mental steps leading from the prior art to the claimed invention that are linked through pointers or hints inherent to their knowledge of the prior art. The inventive step test is thus constructed as hypothetical, objective and focussed on what is obvious. The actual process of devising an invention, or the concrete inventor's steps taken, are merely incidental. Hence, the inventive step test, as currently designed, does not reflect the human aspects of inventing, or what was framed in the previous chapter as a genuine intellectual activity expended on solving a

63 European Patent Office (n 58) Part G, Chapter IV [2].

64 ibid Part G, Chapter VII [5.1].

65 *Combustion engine,* T 0426/88 of 9 November 1990, EP:BA:1990:T042688.19901109 [6.4].

66 *Genentech/Expression in yeast,* T 445/91 of 20 June 1994, EP:BA:1994:T045591.19940620 [5.1.3.3].

67 *()*, T 1317/08 of 15 May 2012, EP:BA:2012:T131708.20120515 [2.11].

technical problem. In the EPO's decision-making practice, the question of inventive step is considered to be a matter of substantive law.[68]

In summary, when taken from the perspective of the EPO examiners, the inventive step test is designed so that when they construe the invention, the PSA, and determine the closest prior art, they must decide whether there is a chain of obvious steps leading them (or the PSA) from the prior art to the invention. Thereby, the emphasis is put on whether the prior art contains enough of sufficient pointers that hint at the invention. If the intellectual journey from the prior art to the invention is not interlaced with pointers, nudges, routine procedures or expected results, the invention is likely to pass the inventive step test.

3.2 United Kingdom

The pre-EPC 1973 edition of Terrel on the Law of Patents states clearly that the way in which an inventor arrived at an invention is without significance for the inventive step assessment.[69] Though not yet listed as a patentability requirement, under section 32(1)(f) of the Patents Act 1949, a patent could be invalidated for being obvious and not involving any inventive step vis-à-vis technology known in the UK before the priority date of the claimed invention.

In case law cited in Terrel on the Law of Patents of 1982, courts in several cases refer to inventive ingenuity or inventive faculties (which evokes a reflection of human inventorship). For instance, conceptions of invention and inventive step seem to go hand in hand in the sense that no ingenuity means no invention:

> If the new use involves no ingenuity, but is in manner and purpose analogous to the old use, although not quite the same, there is no invention […On the other hand,] a

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68 *()*, R 0005/13 of 10 February 2014, EP:BA:2014:R000513.20140210 [13].

69 Aldous, Falconer and Aldous (n 14) [301].

> patent for a new use of a known contrivance is good, and can be supported if the new use involves practical difficulties which the patentee has been the first to see and overcome by some ingenuity of his own. An improved thing produced by a new and ingenious application of a known contrivance to an old thing, is a manner of new manufacture within the meaning of the statute.[70]

Section 3 of the Patents Act 1977, currently in force, states that '[a]n invention shall be taken to involve an inventive step if it is not obvious to a person skilled in the art.' Thereby, it establishes a legal fiction that the requirement for inventive step is fulfilled if the invention is not obvious over certain matter and to a certain notional person. It follows that courts' conclusions concerning an inventive step are conditioned upon their framing of the prior art and the PSA (in the same way as the EPO does) and their understanding of obviousness and their assessment thereof.

The UK courts have shown a steady reluctance to define the concepts of non-obviousness or obviousness respectively.[71] In this respect, Justice Diplock is often referred to:

> I have endeavoured to refrain from coining a definition of "obviousness" […] The correctness of a decision upon an issue of obviousness does not depend upon whether or not the decider has paraphrased the words of the Act in some particular verbal formula. I doubt whether there is any verbal formula which is appropriate to all classes of claims.[72]

In the absence of a definition of obviousness, the UK courts approach obviousness as a multi-factorial[73], a kind of jury question, whereby finding obviousness depends on concrete

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70 *Gadd and Mason* v. *Mayor etc. of Manchester* 9 RPC 516. This case was chosen because 'it has frequently been applied.' William Aldous, David Young, Antony Watson and Simon Thorley, *Terrell on the Law of Patents* (13th edn, Sweet & Maxwell 1982) 138-139.

71 This approach was summarised in *Novartis AG v Generics (UK) Limited* [2012] EWCA Civ 1623 [57]-[58].

72 *Johns-Manville Corporation's Patent* [1967] FSR 327, 332.

73 *Actavis UK Ltd v Novartis AG* [2010] EWCA Civ 82, [2019] Bus LR 1318 [41].

circumstances of the case.[74] The courts developed a so-called 'Windsurfing/Pozzoli test'[75] which culminates by the courts asking whether the identified differences existing between the matter cited as forming part of the state of the art and the inventive concept would have been obvious to a person skilled in the art.

One can observe interesting dynamics when it comes to delineating a boundary between the legal term of obviousness and the test used for ascertaining whether the inventive concept would, in fact, have been obvious. Despite crafting the Windsurfing/Pozzoli test and thereby presumably extending the domain of rules, the impression from the case is that the UK courts lean towards deciding obviousness predominantly as a question of fact.

As put by Kitchin J, 'the question of obviousness must be considered on the facts of each case. The court must consider the weight to be attached to any particular factor in the light of all the relevant circumstances'.[76] The relevant circumstances and facts are those that are regarded as relevant by the courts in the respective case. In principle, this means courts of the first instance because the appellate courts should abstain from interfering with the first instance judge's evaluation in questions which are a matter of degree such as obviousness or negligence.[77]

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74 *Generics (UK) Ltd v H Lundbeck A/S* [2007] EWHC 1040 (Pat), [2007] RPC 32 [72], in this part confirmed by the Court of Appeal in *H Lundbeck A/S v Generics (UK)* [2008] EWCA Civ 311, [2008] RPC 437, [24].

75 The steps of the test are the following: the court (i) first identifies a person skilled in the art and relevant common general knowledge of that person, then (ii) draws an inventive concept from the claim and (iii) determines the differences existing between the matter cited as forming part of the state of the art and the inventive concept of the claim. Lastly, (iv) decides whether, viewed without hindsight, the differences constitute steps which would have been obvious to a person skilled in the art or whether they require any degree of invention. *Pozzoli SPA v BDMO SA* [2007] EWCA Civ 588, [2007] Bus LR D117 [23].

76 *Generics v Lundbeck* (n 74) [72].

77 Lord Hoffmann in *Biogen Inc v Medeva* (n 19) [45]. Where the application of a legal standard such as negligence or obviousness involves no question of principle but is simply a matter of degree, an appellate court should be very cautious in differing from the judge's evaluation.

The technical facts enable courts to 'assume the mantle of the normally skilled but unimaginative addressee in the art at the priority date and to impute to him what was, at that date, common general knowledge in the art in question'[78] and to 'understand the thought processes which can lead towards or away from the patented solution.'[79]

For instance, in one case, the claimed inventive concept of coating a self-puller type of a corkscrew with polytetrafluoroethylene (PTFE) in order to achieve better extraction of a cork was found to be obvious on the basis of the prior art and technical analogical thinking:

> [O]n the evidence it was obvious to apply PTFE to any corkscrew. […O]nce the idea of coating a corkscrew with PTFE was known to improve the penetration of the cork by one type of corkscrew, it was self-evident that it would improve the penetration by any corkscrew, as indeed it was self-evident to [the expert witnesses].[80]

The claimed better extraction effects were found to be just 'a golden bonus' which will not make the invention inventive 'if the claimed innovation is obvious for another purpose',[81] ie improved penetration in this case.

Where the activity of devising inventions demands trial and error and plenty of experiments to be undertaken under various levels of uncertainty as to their results, looking for inferential, analogical, and deduction-lead thinking seems inappropriate to answer the obviousness question. Rather, courts ask whether it would have been obvious for a PSA to pursue a particular research pathway with a fair expectation of success.[82]

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78 *Pozzoli SPA v BDMO SA* (n 75) [14].

79 *Haberman and Another v Jackel Intl Ltd* [1999] FSR 683, 698.

80 *Hallen Co and Another v Brabantia (UK) Ltd* [1991] RPC 195, 216.

81 ibid.

82 *Conor Medsystems Inc v Angiotech Pharmaceuticals Inc* [2008] UKHL 49, [2008] 4 All ER 621 [42]. Put in other words, the courts investigate whether a notional PSA 'would assess the likelihood of success sufficient to warrant a trial.' *Johns-Manville Corporation's Patent* (n 72) 328.

If, however, the 'expectation of success' aspect somehow disconnects itself from technical considerations, the obviousness question may become more ambiguous and the relevant factors non-technical.

> Whether a route has a reasonable or fair prospect of success will depend upon all the circumstances including an ability rationally to predict a successful outcome, how long the project may take, the extent to which the field is unexplored, the complexity or otherwise of any necessary experiments, whether such experiments can be performed by routine means and whether the skilled person will have to make a series of correct decisions along the way.[83]

In another case, commercial considerations were raised as relevant. It did not suffice to show that a PSA could have arrived at the invention, but it needed to be proven that they would have done so.[84] 'Whether he would actually press ahead and implement the idea depends on a host of other, commercial considerations.'[85] Additionally, expectation of success may be influenced by confidence: '[t]he question which the judge had to assess […] was whether that confidence would have ebbed away so much at the [invention] that the skilled team would no longer have confidence to try it.'[86]

Thereby, non-technical considerations such as commercial considerations, confidence, motives to come up with the solution, the number of possible ways to arrive to the solution, the effort and obstacles on the way and the chances of arriving to the solution[87] have been regarded as relevant.

On the one hand, this makes the PSA standard rather plastic and almost alive as it absorbs all the human aspect of inventing and attempts to emulates the process of solving a particular technical problem. On the other hand, such inclusions of non-technical

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83 *MedImmune Ltd v Novartis Pharmaceuticals UK Ltd* [2012] EWCA Civ 1234, [2012] 10 WLUK 325 [91].

84 *Actavis v Novartis* (n 73) [46].

85 ibid.

86 *Hospira (UK) Limited v Genentech, Inc* [2015] EWCA Civ 57, [2015] CN 229, CA [46].

87 *Generics v Lundbeck* (n 74) [72].

considerations can completely distort the inventive step test. It can even eventually lead to discrimination between those areas of technology that are driven by deductive method of thinking and those that are driven by inductive methods and experimenting. Following the lead of commercial considerations and confidence may become limitless, as pointed out by Sir Hugh Laddie:

> If the reward for finding a solution to a problem and securing a monopoly for that solution is very high, then it may well be worthwhile for large players to examine all potential avenues […] What makes something worth trying is the outcome of a simple risk to reward calculation. Yet, if the reward is very large, the avenues worth trying will be expanded accordingly.[88]

Against the background of the Windsurfing/Pozzoli test comparing the prior art and inventive concept, a recent case *Actavis v ICOS*[89] is welcomed because of its back to the basics approach. In *Actavis v ICOS,* the Supreme Court stressed in that case that the problem-and-solution tests should not be applied mechanistically.[90] This case cautions against the reduction of the assessment of an inventive step to a mere test for non-obviousness as manifested in the invention. The Supreme Court held that an invention can (wrongly) be found inventive only because in its concrete form (e.g. 5mg dose in *Actavis v ICOS*) it would have been non-obvious and surprising to the PSA at the beginning of the process of its devising.

However, it would be a mistake to infer an involvement of an inventive activity from non-obviousness of the invention because the non-obvious air of the invention does not make the routine, non-inventive steps (which would have led to its devising) inventive. As reiterated by the Supreme Court, the steps or the activities which would have been undertaken by a PSA in the process of devising the invention are decisive.

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88 Hugh Laddie, 'Patents – what's invention got to do with it?' in David Vaver and Lionel Bently (eds), *Intellectual Property in the New Millennium* (CUP 2010) 93.

89 *Actavis Group PTC EHF v ICOS Corporation* [2019] UKSC 15, [2019] Bus LR 1318.

90 ibid [62], [67]–[72].

In most cases, the primary evidence, ie testimonies of expert witnesses called to court, are conclusive.[91] They serve to identify and give an account of the intellectual world of a notional PSA as well as the common general knowledge and uninventive though informed steps in the field leading from the matter towards the invention. Secondary evidence focuses on historical reality. It provides a reality check where the reconstruction of the obvious way from the prior art to the invention could be unduly inspired by the hindsight. As put by Justice Laddie:

> Many patented inventions operate in accordance with simple principles of physics, chemistry or other sciences. […] So, working from those principles, the solution must be obvious. In such cases it is also easy to take the relevant expert witnesses under cross-examination through a series of logical steps which lead to the solution. The simpler the solution, the easier it is to explain. The easier it is to explain, the more obvious it can appear. This is not always fair to inventors.[92]

Among the secondary evidence one counts sources documenting the contemporaneous events, reactions to the invention, the realities surrounding making the concrete invention and actual ways of approaching the concrete technical problem undertaken at the time of the invention.[93]

On the whole, the UK courts seek to reconstruct what a notional PSA would have done in order to solve the underlying technical problem and how they would have proceeded on their way from the prior art to the claimed invention. For this purpose, differences and connections between the prior art and the claimed invention are examined

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91 *Molnlycke AB and Another v Procter & Gamble Limited and Others (No. 5)* [1992] FSR 549, 213.

92 *Haberman v Jackel* (n 79) 697-698.

93 A list of secondary factors was provided by Justice Laddie in *Haberman v Jackel* (n 79) 699-701. To determine whether a development was obvious or not the following matters were relevant: (a) What was the problem which the patented development addressed? (b) How long had that problem existed? (c) How significant was the problem seen to be? (d) How widely known was the problem and how many were likely to have been seeking a solution? (e) What prior art would have been likely to be known to those expected to have been involved in finding a solution? (f) What other solutions were put forward in the period leading up to the publication of the patentee's development? (g) To what extent were there factors which would have held back the exploitation of the solution even if it was technically obvious? (h) How well had the patentee's development been received? (i) To what extent could it be shown that the commercial success was due to the technical merits of the development?

as a sequence of steps in the intellectual process of solving a problem. Next, courts evaluate whether taking each intellectual step would have been pre-determined in the light of the prior art, common general knowledge, or a routine procedure.[94] Where a continuous sequence of intellectual steps is found there is obviousness established. To put it from the inventor's contribution end and in the words of Lord Hoffmann: 'the inventive concept is a relationship of discontinuity between the claimed invention and the prior art'.[95]

In summary, UK courts engage with the process of devising the alleged invention as it would have been hypothetically conducted by the PSA, rather than trying to construe as it had actually happened. Thereby, neither the actual inventor's inventive step nor inventor's intellectual process preceding realization of the invention are put to test. In essence, the UK courts search for a strictly non-creative process in order to activate the statutory fiction of an invention being deemed to involve an inventive step if it is not obvious to the PSA.[96]

3.3 France

Pursuant to Article L611-14 of the Intellectual Property Code, 'an invention is deemed to involve an inventive activity, if, for a person skilled in the art, it does not flow from the prior art in an obvious way'. Before this requirement was enacted in 1968, the content corresponding to the current conception of the inventive activity used to be identified under the umbrella of the novelty requirement.[97] Bach then, the notions of inventive activity and invention were regarded as closely related:

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94 ibid [72].

95 *Yeda Research v Rhone-Poulenc Rorer International Holdings Inc* [2007] UKHL 43, [2007] Bus LR 1796 [20].

96 Patents Act 1977, s. 3.

97 Passa (n 31) [178].

> No doubt, inventive activity presents itself in the domain of facts in multiple forms; in effect the inventive originality can reside either in the principle of the invention and the idea on which it is founded, or in the means of realisation of the invention and the difficulties that its author had to overcome, or quite simply in the results of the invention and the unexpected advantages which it brings to the industry.[98]

Professor Roubier further elaborates on the notion of inventive activity and argues that the 'intuitive character'[99] of the inventive activity together with luck and chance are 'very ancient in our case law where the inventive idea is often presented as "mother-idea and fundamental" which means that it is the basis of the creation that explains its goal, the problem to which its author applies it in order to solve it.'[100]

Though Roubier's scholarship is valued and often referred to by modern French commentators, in respect of the inventive activity his understanding was not appreciated by everyone. Though in 1956 his interpretation of novelty as non-obviousness to a person skilled in the art was applied by a court in Seine[101] and his doctrine of inventive idea was adopted by a court in Paris,[102] soon afterwards, his construct of an inventive idea was rejected as not being based on the law in force and for introducing a risk of subjectivity.[103] The Court of Appeal in Paris restated in 1961 that there is only one patentability criterion: an objective novelty.[104] After the enactment of the inventive activity requirement in 1968

98 Roubier (n 29) 58.

99 ibid 59.

100 ibid 59-60.

101 Thierry Mollet-Viéville, 'L'instauration du critère d'activité inventive en France' in IRPI (ed), *L'Activité inventive* (Acte de colloque 2019) 15.

102 Jean-Christophe Galloux, 'La progression du critère de l'activité inventive en droit français' in IRPI (ed), *L'Activité inventive* (Acte de colloque 2019) 21.

103 Pierre Devant and others, *Les brevets d'invention* (4th edn, Librairie Dalloz 1971) 68.

104 Galloux (n 102) 21.

(following the harmonisation efforts in Europe) and in its first years in force, the courts found themselves to examine also the inventor's process of creation.[105]

Nowadays, the modern French approach to interpretation and application of the inventive activity requirement closely follows the one of the Boards. French courts conduct a case-by-case analysis of whether an invention would have been obvious for a PSA when compared with the prior art at the priority date. They scrutinise the invention under the objective, problem-and-solution test.[106]

Building on the practice of the Boards, the French courts define the PSA as a professional 'in the technical field where the problem arises which the invention, a subject matter of the patent, proposes to resolve'[107] and 'who possesses average qualities and normal knowledge'.[108] One of the aspects of the PSA is that they have at their disposal state-of-the-art tools and machines. For instance, in one case, the PSA was defined 'as a specialist in the matter of security and resilience […] who has at his disposal specific machines enabling thermal fusion which were available on the market'[109] for more than ten years before the date of filing of the patent in question.

In another case, it was held that as the PSA is an engineer in optics of liquid crystals they are 'not considered to possess such means of computational simulation as an institution like the [French National] Atomic Energy Commission'.[110] The attribution of tools and machines to the notional PSA realistically reflects the position of experts in many technical fields whose routine work and its quality depends on them. However, the evaluation of

105 ibid 25-26.

106 Passa (n 31) [190].

107 Cour de cassation, Decision of 20 November 2012, PIBD 2012 III 857.

108 Cour d'appel de Paris, Decision of 19 January 1978, PIBD 1978 111 348.

109 Cour d'appel de Paris, Decision of 13 November 2002, PIBD 2003 762 III 201.

110 TGI de Paris, Decision of 19 January 2005, PIBD 2006 807 III 254.

what resources are 'average' or 'normal' and thus justified to form a part of the PSA concept introduces an element of arbitrariness to the assessment.

After a French court puts itself in the shoes of a notional PSA, construed specifically for each individual case, it proceeds to ask whether the PSA would have resolved the problem in the same way as the inventor did by conducting 'every day and normal executive operations'.[111] Even though the conception of the inventive activity 'presupposes certain ingenuity'[112] the subjective aspect is suppressed and the inventor' input such as effort or merit are not put to test. Similarly, even though French doctrine acknowledges the necessity of the intellectual process resulting in an invention, the inventiveness is to be assessed objectively and externally to that process.

> [D]etermination of an inventive activity must result, in essence, from an assessment of an intellectual process which led to a realization of the invention taking into account the state of the art at the time of conception of the invention, whereby, in accordance with law, this assessment must be done on the basis of evidence. […M]ore concretely, the judge must ask himself whether, at the moment when the invention was conceived, for a practitioner in the industry, who is perfectly aware of the prior art, […] the novel element or novel elements which form the subject matter of the invention were obvious from the prior art.[113]

Similarly to German law, some indications of inventiveness have been formulated on the basis of case law. They work as 'a presumption which is not [however] sufficient to establish presence or absence of an inventive activity'[114] For instance, the following indicates inventiveness: circumventing an established prejudice,[115] formulation of a novel technical problem, bringing a synergistic effect, unexpected or surprising results, selection

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111 Pollaud-Dulian (n 33) [315].

112 Azéma and Galloux (n 30) [344].

113 *Cosmao c. Metériel Moderne Marchand*, TGI de Paris, Decision of 17 December 1973, as quoted in Jean-Lus Piotraut and Pierre-Jean Dechristé, *Jugements et arrêts fondamentaux de la propriété intellectuelle* (TECHNIQUE & DOC 2002) [111].

114 Institut national de la propriété industrielle, *La délivrance des brevets et des certificats d'utilité* (INPI 2016) 95.

115 Cour de cassation, Decision of 19 December 2000, PIBD 2001 721 III 277.

from among a great number of possible solutions, combining at least three documents of prior art,[116] etc. One can observe that these indications relate either to the invention, its effects, or other external factors, but neither of them reflects the intellectual process resulting in the invention.

In summary, French inventive activity test is largely based on the test applied by the Boards. Thereby, it is focused on the invention itself, its effects, and an objective assessment of its standing against the prior art only. In terms of results, the current inventive step tests is far from perfect. Though this does not relate to the human aspects of inventing, it is noteworthy that the test as such has other flaws besides failing to check for the human intellectual activity. Statistics from the years 2008-2016 show that 45% of litigated French patents were invalidated before French courts with the main reason for invalidation being the lack of inventive activity.[117]

Moreover, the inventive step test in its current form leaves no space for proving the existence of the underlying process of inventing and whether it involved the required human intellectual activity of inventive quality. To the contrary, it is sufficient to find that 'the state of the art did not suggest the invention'[118] and on this basis trigger the statutory provision of 'an invention [being] deemed to involve an inventive activity'.[119]

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116 All in National Industrial Property Institute (n 114) 96.

117 Sabine Agé, 'Introduction de la session' in IRPI (ed), *L'Activité inventive* (Acte de colloque 2019) 67-68.

118 Cour de cassation, Decision of 8 October 2002, PIBD 2002 754 III 564.

119 Code de la propriété intellectuelle (Loi n° 92-597 du 1er juillet 1992 relative au code de la propriété intellectuelle, as amended as of 26 novembre 2021) ('French Intellectual Property Code') art L611-14.

3.4 Germany

Pursuant to § 4 German Patent Act, 'an invention is deemed to involve an inventive activity (*eine erfinderische Tätigkeit*) if, for a PSA, it does not flow in an obvious way from the state of the art'. Traditionally, the inventive activity represents 'a qualitative patentability criterion […] which is oriented to creativity of the technical achievement'.[120] The same approach as at the EPO is anticipated on the basis of the same wording of the requirement and a few particularities can be noted.

In German tradition, inventive activity seems to have been conceptualised spatially. It is perceived as a border that separates a patent-free area which should be reserved for further uninventive expansion of the prior art and a 'domain of creative technical achievements'.[121] A greater distance or a substantial difference from the known, both understood in their qualitative rather than quantitative sense, signal an inventive activity.[122]

For German courts, similarly to the Boards, inventiveness is a question of law to be answered through assessment of facts.[123] The courts' inventiveness inquiry begins with establishing the key facts relating to the invention and the relevant technical knowledge which are to be ascertained through the eyes of the PSA. A scheme similar to the EPO's problem-and-solution approach is applied.[124]

Next, a more detailed set of questions relating to PSA's actions are to be addressed: (a) Which steps would the PSA have to undertake so that they achieved the solution of the

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120 Claus Asendorf and Christof Schmidt, 'Erfindung auf Grund erfinderischer Tätigkeit' in Georg Benkard (ed), *Patentgesetz* (CH Beck 2015) [17].

121 ibid [2].

122 Alfred Keukenschrijver, '§ 4 Erfinderische Tätigkeit' in Rudolf Busse and Alfred Keukenschrijver (eds), *Patentgesetz* (de Gruyter 2016) [108].

123 *Vorausbezahlte Telefongespräche*, Decision of 7 March 2006, X ZR 213/01 [2006] GRUR 663 [28].

124 Keukenschrijver (n 122) [25]. See also Nack (n 43) [566].

patent in question? (b) Would they have had any instigation or consideration prompting them to set the direction towards the invention? (c) What are the reasons for or against the fact that the PSA would have arrived on the basis of such considerations to the solution proposed in the patent in question?[125]

Though well-elaborated, detailed and well-suited for bureaucratic purposes of the patent offices, the German version of the inventive step test does not score high in terms of quality either. Statistics show that in the years 2010-2013, 40% of litigated German patents were invalidated and further 38% were partially invalidated, with 45% of cases (56% of cases in the field of software / telecoms) citing the lack of inventive activity as the reason.[126]

In this framework, the focus is on the hypothetical process of thinking and acting which would have been performed by a PSA. Keukenschrijver, a former German Supreme Court judge, summarises case law and lists certain activities typical for a PSA. For instance, combining known features without any surprising effect or such an effect that brings known advantages when used in known arrangements is not inventive.[127] Similarly, taking a number of routine steps does not substantiate an inventive activity.[128]

On the other hand, it can be ruled in favour of an inventive activity whenever an application of known general principles to an individual case required overcoming technical obstacles, solid theoretical considerations or answering a series of objectively difficult questions.[129] Equally, reversing a bias, misleading belief or technical

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125 Asendorf and Schmidt (n 120) [21].

126 Peter Hess, Tilman Muller-Stoy and Martin Wintermeier, 'Are patents merely "Paper Tigers"?' (*Bardehle Pagenberg* November 2014) 6-7 <https://www.bardehle.com/en/ip-news-knowledge/publication/detail/are-patents-merely-paper-tigers> accessed 3 December 2021.

127 Keukenschrijver (n 122) [87].

128 ibid [108].

129 ibid [116].

stereotype[130](without merely diverging from the commonly established practice)[131] testify to inventive activity. Another indication of inventive activity is when the PSA would have been surprised by the invention.[132]

How the actual inventor arrived at the invention, their career, intensity of their effort or any other such subjective elements are irrelevant for the assessment.[133] Hence, whether the inventor's activity was inventive does not hinge on its nature nor its involvement of human creativity. Rather, it is judged solely according to its results against the prior art.[134]

The final issue that deserves a few lines of attention is a question of whether the technical solution is obvious to the PSA is a matter of law which is to be answered through assessment of facts.[135] In German law, the term of inventive activity represents a vague legal term[136] whose content requires a decision evaluating an act on one hand, and thereby it is formed by the view of the parties to dispute, and on the other hand, it is based on factual grounds.[137]

In summary, the phrasing of § 4 of German Patent Act suggests that an actual human inventive activity is required in order to meet the inventiveness patentability requirement. However, no direct proof of human creativity being involved in devising an invention is required. In practice, German courts construe a PSA and observe their *modus operandi* as

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130 ibid [48]-[49].

131 *()*, Decision of 6 September 2005, X ZR 15/02 (Nr 53), BeckRS 2005, 12492 [35].

132 *Disiloxan*, Decision of 27 February 1969, X ZB 11/68 [1969] GRUR 265, 266.

133 Rainer Moufang, 'Erfinderische Tätigkeit / inventive activity Art 56 EPÜ, § 4' in Rainer Schulte (ed), *Patentgesetz mit Europäischem Patentübereinkommen* (Carl Heymanns Verlag 2017) [7].

134 Christoph Ann, 'Erfinderische Leistung' in Rudolf Kraßer and Christoph Ann (eds), *Patentrecht* (8th edn, CH Beck 2016) [11]. See also Asendorf and Schmidt (n 120) [23].

135 ibid [21].

136 Keukenschrijver (n 122) [8].

137 Asendorf and Schmidt (n 120) [5].

they seek to arrive at the invention through checking the possible solutions suggested by the prior art. Thereby, the German inventive step test closely scrutinises a hypothetical thinking process entertained by a notional PSA and what results it would have rendered. Consequently, the mere existence of an invention coupled with establishing an absence of a non-inventive activity which would have led to it, triggers the statutory fiction of an invention involving an inventive activity.

4 CONCLUSION

Under the EPC, patents shall be granted for any invention that fulfils the secondary patentability criteria. The requirement for an invention is normally interpreted as requiring a subject matter having a technical character (or in the UK, that makes a technical contribution). This conception of invention used in practice ignores the guidance given by the EBA according to which an invention entails a human intervention which directly and causally determines the relevant elements of the subject matter and is thus attributable to a human being. The traditional, pre-EPC 1973, national conceptions of invention reflected the human aspects of creation more clearly, especially through perceiving the invention as a human creation vis-à-vis a discovery (the UK, France).

Notwithstanding the historical roots of the concept, in practice, the authorities rarely consider the human aspects of inventing. Instead, they proceed on the assumption that any subject matter that has one or more technical features has the technical character required of an invention. However, what this test fails to reflect is that from the mere presence of a technical feature one cannot infer that the subject matter was determined by a human creative intervention. Thereby, any test focusing solely on whether the subject matter has a technical character is inadequate to detect the lack of human inventorship.

An invention must, inter alia, involve an inventive step (or an inventive activity) in order to be patentable. The traditional conceptions of inventive activity varied: in the UK it meant non-obviousness, in Germany an inventive level and in France a genuine intellectual activity (though in short periods only). Nowadays, the requirement for inventiveness entails an assessment of whether an invention, with regards to the state of the art and the objective technical problem, would have been obvious to a skilled person. The inventive step test is framed, and its key elements—the prior art, a PSA and obviousness—are determined by the relevant patent statutes and examination practices.

Being a matter of judgment, however, the inventive activity assessment proceeds on a case-by-case basis and each invention requires its own obviousness analysis. A host of factors play a role in the evaluation, ranging from technical to business and behavioural considerations related to the PSA and their relevance depends on the particular context of inventing. If the absence of strictly non-creative thinking and decision-making process is established the inventiveness requirement is deemed to be fulfilled.

In the previous chapter it was shown that the requirement for inventive activity could be interpreted as having two components: (i) an involvement of a step (or an activity) (ii) that is of inventive quality. The analysed cases show that the first aspect, an activity resulting in the invention, is taken for granted without being examined, on the assumption that only human beings are capable of the activity of inventing. Consequently, only the second aspect, whether the assumed activity is inventive, is addressed by the authorities.

The result is that, in effect, the current epistemic approaches in the UK ignore the concept of invention while in Germany and France they treat an invention as an output, ie an advancement of the state of the art, and asses its quality. The latter approach corresponds to the traditional German spatial view in which the inventor is required (presumably through performing an activity) to arrive farther than a notional PSA would have gone by

taking obvious steps. Since patentability of a subject matter is assessed on the basis of its standing vis-à-vis the state of the art with disregard to the process by which it was devised, such a method of assessment is inadequate to detect that the inventive technical features may not have originated directly from the human intellectual activity.

A noteworthy development was recorded in the UK where the Supreme Court attempted to put the inventive step test back in its place of benchmarking an intellectual activity against a hypothetical technical intellectual activity of a PSA. The examination of steps of the PSA is limited to solving the technical problem. Hence, it can be inferred that the activity of solving the technical problem or the attempts to bring about the inventive technical features made by the PSA roughly correspond to the relevant process of inventing.

If the courts realise the significance of *Actavis v ICOS* and focus strictly on the hypothetical technical PSA's steps instead of a mere impression of non-obviousness of the final subject matter, the inventive step test would have better chances to detect subject matter whose devising lacked the required human intellectual activity. To achieve this, such a test would also need to be supplemented by a broader disclosure duty of the technical problem and solution imposed on patent applicants, see Chapter VII.

CHAPTER V.

AUTHORSHIP IN THE SELECTED JURISDICTIONS

1 INTRODUCTION

In contrast to European patent law, in European copyright (author's rights) law it is widely accepted that human origin and history of creation of an authorial work matter for copyright protection.[1] Authorship is traditionally understood as a relationship between an author and their work.[2] As every relationship, this one also can be approached from either of its ends – from the perspective of the author or from the perspective of a work.

The present chapter approaches the relationship from the standpoint of author and deals with what one must do, according to positive law, to become an author. The next two chapters will look at the same relationship from the perspective of the work and properties of an authorial (original) work. The primary objective of all these chapters is to learn more about the underlying activity which makes a person the author and a subject matter their authorial work or, put differently, their own intellectual creation.

These chapters adopt a doctrinal approach and follow courts' considerations of authors, authorial contributions and works. Since human authorship is, in principle, presumed until it is disputed, courts rarely have the opportunity to entertain the nature of the relationship. This is reinforced by the long-established assumption that only human beings are capable of creating works of literature and art.

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1 The present thesis is limited to rights in authorial works.

2 As put by Professors Biron and Bently, 'The relationship dimension refers to the context of the putative joint author's creative activity.' in Laura Biron and Lionel Bently, 'Discontinuities between legal conceptions of authorship and social practices. What if anything, is to be done?' in Mireille van Eechoud (ed), *The Work of Authorship* (Amsterdam University Press 2014) 238.

However, in the light of the evidence of AI-driven systems' capabilities to determine the expressive elements of the subject matter, the need to drop assumptions and formulate a more nuanced requirement for human authorship has become evident. As the literature review below shows, this need has not been addressed by scholarship satisfactorily. Rather, the scholarship continues to discuss authorial contributions in terms of quality and quantity on a relatively high level. The problem of whether human-AI productions have a human author cannot be resolved at this level, since there are AI-driven systems that can, as a matter of fact, make contributions which are equivalent to the required authorial contributions in terms of quality and quantity.

While this thesis proceeds on the basis that there are AI-driven systems that can make contributions that are on a par with authorial contributions, it does not argue that a mere fact of making such contributions would suffice to establish an AI-driven system as an author. On the contrary, given the human creativity underpinnings of copyright law, such contributions cannot be regarded as genuinely authorial precisely because of the absence of human author. The present chapter (or thesis) does not, at any instance, consider an AI-driven system as a potential author. (The principled importance of the human author-creator is addressed in the following section.)

As follows from the literature review, some human input is needed for there to be a work. Yet, would any human being taking part in the process of creation of a work and making intellectual contributions count as its author? To put this in family relations terms, does a subject matter has to have a human parent (an immediate human creator) or is having a human grandparent (a person making the arrangements necessary for creation and having an overall idea of possible creation of grandchildren) sufficient? To answer this question, this chapter analyses authorship and authorial contributions for ownership purposes under copyright laws in the UK, France and Germany. More specifically, it looks at the respective

constructions of authorship, the significance of the act of creation and activities that constitute the act of creation with a view of conceptualising the relevant human activity.

In addition, the UK copyright statute provides for a fiction of author in relation to authorless computer-generated works. Despite the relevant statutory provisions having gained a positive appraisal in the scholarly literature (with few exceptions), this chapter takes a critical stance against these provisions. Among the few critics, Patrick Goold reads the provisions so that they are either meaningless if originality of a computer-generated work is required or extending copyright protection to a new category of non-original literary, dramatic, musical or artistic (LDMA) works.[3] This chapter disagrees with him only in the latter part of his argumentation and brings contribution to the literature by showing that arguing a mere possibility of copyright for non-original LDMA works goes beyond the text and spirit of the statute itself.

2 COPYRIGHT AS RIGHTS FOR AUTHORS – HUMAN CREATORS

Current copyright laws, including the international copyright standards instrument—the Berne Convention—assume a human nature of authors, though this can be proven only indirectly. According to Professor Ricketson, during the Berne Convention drafting process, there was a basic agreement as to the meaning of 'author' and 'there was very little debate about the subject, so it seems only logical to interpret "authors" and "authorship", for purposes of the Convention, as pertaining to the persons who created such works'.[4]

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3 Patrick Goold, 'The curious case of computer-generated works under the Copyright, Designs and Patents Act 1988' (2021) 2 IPQ 120, 121-122.

4 Sam Ricketson, 'The 1992 Horace S. Manges Lecture - People or Machines: The Berne Convention and the Changing Concept of Authorship' (1991) 16 Colum-VLA JL & Arts 1, 8.

The Berne Convention implies the human nature of author at various instances, eg Article 6bis of the Berne Convention provides for moral rights of authors.[5] Moral rights are associated with human beings only and hence the assumption embodied in that provision was that the author is a human being. As Professor Ginsburg argues, copyright is largely justified by author's natural rights on the basis of 'personal creativity, and that largely underpins the Berne Convention'.[6]

Professor Dietz, a German expert on comparative copyright law, brings a series of evidence from negotiating of the Berne Convention and its Protocols to substantiate the claim that the notion of author was used in the Berne Convention and beyond to denote exclusively a natural person who created the work. In his words, 'an examination of the whole system of the Berne Convention up to the last revisions in Stockholm/Paris also reveals that only natural persons who have created works are considered authors'.[7] He further claims that the absence of an explicit definition of author in the Berne Convention and national differences in the conceptions of author and authorship do not mean that the recognition of the human author – creator is optional (in the Berne Convention's legacy).[8]

Dietz also observes that in common law countries, there may be a confusion between (i) authorship as original creation (in fact) and (ii) authorship as original attribution for ownership purposes.[9] He defends the conceptual purity of authors as creators against other

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5 'Independently of the author's economic rights, and even after the transfer of the said rights, the author shall have the right to claim authorship of the work and to object to any distortion, mutilation or other modification of, or other derogatory action in relation to, the said work, which would be prejudicial to his honor or reputation.' Berne Convention for the Protection of Literary and Artistic Works (Paris Act of 24 July 1971), as amended on 28 September 1979 ('Berne Convention') art 6bis(1).

6 Jane Ginsburg, 'People Not Machines: Authorship and What It Means in the Berne Convention' (2018) 49 IIC 131, 134.

7 Adolf Dietz, 'The Concept of Authorship Under the Berne Convention' (1993) 155 RIDA 26.

8 ibid 4 and 10.

9 ibid 38.

persons in whom national copyright laws may initially vest the rights and, at that occasion, call them authors. Referring to the US-domiciled works-for-hire, he argues that it is just an implicit assignment by virtue of the copyright statute which is actually compliant with the creator doctrine because 'at least for a logical second at the moment of creation of the work, authors under the [Berne] Convention are the original owners of the copyright.'[10]

Against the Dietz's insights it appears appropriate to adopt a certain conception of author for the purposes of this thesis. This chapter concurs with the above-cited scholarship that, at least at and from around the end of the nineteenth century,[11] the author was understood to be a human being.[12] As a result, here the notion of author is to designate a human creator in fact, unless stated otherwise. Copyright (or author's rights) are then understood as a bundle of moral and property (or exclusionary economic) rights for authors who are human beings.

In the AI and IP scholarship, the question of the nature of the author has attracted considerable scholarly attention too. Scholars mostly agree that authors for copyright purposes are required to be human beings.[13] For instance, Clifford interprets the US

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10 ibid 40. The 'logical second' would, however, not gain much sympathy in the UK. According to case law on the CDPA, s 11(2) copyright never vests in the employee. Hugh Laddie, Peter Prescott and Mary Vitoria, *The Modern Law of Copyright and Designs*, vol I (5th edn, LexisNexis 2018) 11.25.

11 Berne Convention entered into force on 4 December 1887. WIPO, 'Berne Convention for the Protection of Literary and Artistic Works' <https://wipolex.wipo.int/en/treaties/textdetails/12807> accessed 19 November 2021.

12 A noteworthy exception is the USA joining the Berne Convention system at the end of the 20th century. WIPO, 'Contracting States' <https://www.wipo.int/treaties/en/ip/berne/> accessed 19 November 2021.

13 For instance, Andres Guadamuz, 'Do androids dream of electric copyright? Comparative analysis of originality in artificial intelligence generated works' (2017) 2 IPQ 169. Tanya Aplin and Giulia Pasqualetto, 'Artificial Intelligence and Copyright Protection' in Rosa Maria Ballardini, Petri Kuoppamäki and Olli Pitkänen (eds), *Regulating industrial internet through IPR, data protection and competition law* (Wolters Kluwer 2019). With the exceptions of, for instance, Annemarie Bridy, 'Coding Creativity: Copyright and the Artificially Intelligent Author' [2012] Stan Tech L Rev 5 claiming that human authorship is not explicitly required or Margot Kaminski, 'Authorship, Disrupted: AI Authors in Copyright and First Amendment Law' (2017) 51 UCD L Rev 589, 600 leaving it open and for a jury to decide.

copyright as implicitly requiring a human author.[14] Ginsburg advocates for the human nature of the copyright author too.[15] As summed up by scholars from the continent, Deltorn and Macrez, '[t]he creator is […] unambiguously required to be a human being.'[16]

3 AUTHORSHIP IN SCHOLARSHIP

Though there seems to be an agreement on the need for human authors, scholars have crafted different definitions of authorship none of which, as argued here, is comprehensive and exhaustive enough to address the advancements in AI. According to Professor Ginsburg, 'most national copyright laws agree that mere execution does not make one an author. An "author" conceives of the work and supervises or otherwise exercises control over its execution.'[17] She puts emphasis on the conception of the work whose essence 'is the formulation of a complete creative plan for the work'.[18]

In addition, she observes that while authorship is universally understood as synonymous with originality, at the same time, states formulate different conceptions of originality.[19] Thereby they may depart from the common authorship ground (if such a ground exists. According to Dietz, for instance, it does.)[20] On the basis of her comparative analysis, Ginsburg formulates authorship as follows: 'an author is (or should be) a human

14 Ralph Clifford, 'Intellectual Property in the Era of the Creative Computer Program: Will the True Creator Please Stand Up' (1997) 71 Tull Rev 1675, 1682.

15 Ginsburg (n 6).

16 Jean Marc Deltorn and Franz Macrez, 'Authorship in the Age of Machine Learning and Artificial Intelligence' in Sean M O'Connor (ed), *The Oxford Handbook of Music Law and Policy* (OUP 2019).

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

18 Jane Ginsburg and Luke Budiardjo, 'Authors and Machines' (2019) 34 Berk Tech L J 343, 409.

19 Ginsburg (n 17) 1078.

20 Dietz (n 7).

creator who, notwithstanding the constraints of her task, succeeds in exercising minimal personal autonomy in her fashioning of the work'.[21]

In contrast, Professor Samuelson reads the US copyright law as 'to treat the person who causes a work to be fixed in a tangible medium as its "author"'.[22] Samuelson demonstrates this on an example that copyright should go to a person who 'most immediately and directly causes music or a story to be generated'.[23] She suggests that the best title is enjoyed by a person who is the last in the chain of causation. However, she does not seem to specify authorship in terms of the right kind and amount of authorial contribution.

Another original account of authorship coming from the US is offered by Professor Boyden. He places communication of a message at the centre of his authorship test:

> If a reasonable person, knowing what the putative author knew, would have tried to convey a given meaning to an audience through the computer program at issue, then the communication of that meaning qualifies as an authored work. The test for authorship should be whether the putative author foreseeably communicated that meaning to the audience.[24]

However, such a test would discriminate against all unpredictable and innovative forms of communication with which the audience might not be familiar.

Professor Buccafusco argues that if a person is to become the author, they must 'intend to produce some mental effect in an audience. […] Copyright will subsist […] in the manner or form by which it is produced *if* that manner is original, minimally creative, and fixed in a tangible medium of expression.'[25] He adds that we should ask after aspects

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21 Ginsburg (n 17) 1092.

22 Pamela Samuelson, 'Allocating Ownership Rights in Computer-Generated Works' (1986) 47 U Pitt L Rev 1185, 1209.

23 ibid.

24 Bruce Boyden, 'Emergent Works' (2016) 39 Colum J L & Arts 377, 394.

25 Christopher Buccafusco, 'A theory of copyright authorship' (2016) 5 Virg L Rev 1229, 1232.

of a work intended to create mental effects instead of asking after ideas and expressions of those ideas embodied in the work.[26] Although his focus on intentionality puts the human aspects of authorship into the spotlight, it is not clear how the intention is to be identified.[27]

Some scholars frame authorship in terms of causal relationship. For instance, Professor Gervais suggests a 'causation of originality' and puts forward the following question: 'Are the creative choices embedded in the code or the user's instructions directly reflected in the production (machine output), the originality of which the court must decide upon?'[28] In another paper, he alerts to 'a break in the legal causation chain between humans and the outcome'.[29] However, it remains open what counts as the relevant input and what kind of intervention of a machine is such that breaks the chain of causation.

Prior to Gervais, the causation approach was taken by Professor Balganesh. He proposes to examine a 'human act as the cause of relevance from a host of background conditions'[30] and recognises an 'independent copyrightable causation requirement'.[31] For this purpose, he also emphasises the telling potency of the process of creation.[32] When formulating his causation requirement, Balganesh uses analogy with tort law and the theories of causation established therein.[33]

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26 ibid 1269.

27 It follows from the structure of the article that this should have been addressed on pp 1265-66 but there seems to be no clear conclusion, not least on whether the test is objective or subjective one.

28 Daniel Gervais, 'The Machine as Author' (2020) 105 Iowa L Rev 2053, 2099-100.

29 Daniel Gervais, 'Human Cause' (2021) Vanderbilt Law Research Paper No. 21-39 (*ssrn* 10 November 2021)<https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3857844#> accessed 19 April 2021.

30 Shyamkrishna Balganesh, 'Causing Copyright' (2017) 117 Colum L Rev 1, 50.

31 ibid 9.

32 ibid 48.

33 ibid 47.

Contrary to the Balganesh's proposal, here it is argued that though taking the detour through a but-for-test and a NESS test[34] and construing an analogical copyright causation may be illuminating in certain aspects, it does not match the needs of copyright.[35] This is so because, first, even if some processes of creation of an authorial work may be complex, they are not as complex and varied as the chain of events that leads to harm which chain may take almost infinite number of forms. Second, there are social preconceptions and expectations about creating works that already operate within copyright law.[36] Thirdly and most importantly, it is argued that granting copyright under uncertainty is not as acute nor as justified as attribution of liability for harm under uncertainty in tort law. This is because the function of tort law is allocation and redistribution of loss[37] which is different from the objectives of copyright to reward and incentivise creativity.

Should the idea of authorship as causal relationship be entertained further, here it is argued that a revised NESS test proposed by Professor Steel, would be a better fit for copyright causation: 'c counts as a cause of e if it is necessary for the sufficiency of a concretely specified set sufficient for e, where sufficiency may be determined both by

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34 Sandy Steel, *Proof of causation in tort law* (CUP 2015) 16–17 and 26.

35 Balganesh himself recognises the limitations of natural causation tests and supplements them with 'legal creation' to sustain the claim: 'Legal creation asks whether the identified human agency ought to lead to an authorship claim as a matter of copyright's goals and principles, even after the court has epistemically identified that agency as the cause of the work'. But this creates its own issues in need of mitigation, see in Balganesh (n 30) 61ff.

36 For example, the only shop in a village has on stock green, black, and yellow colour. Any artist dependent on his stock will necessarily paint with green, black, yellow, brown and/or blue colours (blue and brown and any shades thereof). Thereby, the shop owner's choice what colours to stock is a necessarily sufficient condition for a resulting painting made with the colours bought in his shop. However, the shop owner's stocking choice is legally irrelevant for authorship of the painting despite its being a contribution that satisfies the NESS test. It is legally irrelevant because these choices are not creative in the sense that they would have been made in the process of creation of the painting (to be covered in more detail in the following Chapter). Similarly, the judgment which colours to stock is not a judgment poured into the activity of creating the type of work and thus does not meet the UK law's human authorship requirement (see below). However, the stocking decision (not of painting colours but of a training data set for instance) would amount to undertaking the arrangements necessary for the creation of an eventual computer-generated work under the UK law (see below too).

37 James Goudkamp and Donal Nolan (eds), *Winfield & Jolowicz Tort* (20th edn, Sweet & Maxwell 2020) 1-002.

physical laws of nature and by the requirement of a rule or set of rules.'[38] This test is based on natural causation and mitigated by legal causation.

Even more suitable option seems to be a purely legal causation test: 'the legally effective cause, a link which certainly has its point of departure in natural causation, but which is determined by legal weightings and can be much narrower than natural causation'.[39] However, if these legally effective causes are translated into the existing copyright doctrine, one immediately realises that the legally effective causes of authorial works are, in effect, the authorial contributions.

Despite the US authorship scholarship being inspirational, the US copyright doctrine is not of the main interest in this chapter. Therefore, the attention is better to be turned to the conceptions of authorship in Europe. Professor Pila offers an intentional view of work whereby 'a painting is an intentional realization of a particular idea associated with expressive traditions of painting'.[40] If this definition were to be reformulated from the perspective of the activity instead of the object, the activity of authoring a work could be defined as an intentional realization of a particular idea associated with expressive traditions of authorship. Here it is acknowledged that considering the expressive subject matter in the framework of literary and artistic traditions is fundamental, however, this does not exhaust the matter. There can be a painting produced by applying colours with a brush on a canvas by a robotic hand bringing to life a design produced by an AI-driven system. Such an activity would appear in line with the socially determined, expressive traditions of painting without necessarily warranting that the resulting painting would amount to a human intellectual creation.

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38 Steel (n 34) 33.

39 Helmut Koziol, 'Natural and Legal Causation' in Luboš Tichý (ed), *Causation in Law* (Eva Rozkotová – IFEC 2008) 60.

40 Justine Pila, 'An Intentional View of the Copyright Work' (2008) 4 MLR 535, 542.

From a doctrinal standpoint, Synodinou regards 'a general principle of human intervention as a component of authorship [that] is part of the international copyright acquis.'[41] With reference to *Painer*, she points out that if creative choices made in the earlier stages of the process of creation shape the final form and are reflected in it, they count towards authorial contribution.[42]

While this thesis concurs with this view to some extent, *Painer* is subject to criticism in the following chapter for listing high-level choices in the preparatory stage, eg the use of a technology, among creative. For this reason, *Painer* does not fit neatly with *Infopaq* and traditional national conceptions of authorship which do not regard high-level choices such as choices of style, technique or a particular technology as copyrightable.[43]

Further, Synodinou defines authorship as requiring

> at least a minimum preconception by the author of the general shape of the intellectual form that will be externalized and materialized. In this part it is irrelevant whether part of the materialization of the work is deliberately left to hazard or is made with the use of technical means, provided the author exercises a general control over the creative process.[44]

It remains unexplained though, how the execution can be left to hazard or a machine generating expressive elements and at the same time be under the control of the author. In some sense, a human operator of an AI-driven system is in control of its workings because they control its settings and data being fed into the system. Would a control of this kind be

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41 Tatiana-Helenē Synodinou, 'Pluralism or universalism in international copyright law' in Tatiana Eleni Synodinou (ed), *Authorship in International Copyright Law* (Wolters Kluwer 2019) 564.

42 ibid 573.

43 This holds true for Germany in general. For instance, the use of Hundertwasser-style [Hundertwasserstil], a style of the famous Austrian architect, does not enjoy copyright protection. Gernot Schulze, 'UrhG § 2 Geschützte Werke' in Thomas Dreier and Gernot Schulze (eds), *Urheberrechtsgesetz* (6th edn, CH Beck 2018) [46]. Or as put differently elsewhere: to claim joint authorship 'it is not enough to provide a non-protectable element.' Ulrich Loewenheim, '§ 11 Miturheberschaft und Werkverbindungen' in Ulrich Loewenheim (ed), *Handbuch des Urheberrechts* (3rd edn, CH Beck 2021) [5]. In France, the high-level decision would not give a concrete form to the work. See André Bertrand, *Droit d'auteur* (3rd edn, Dalloz 2010) 136–37.

44 Synodinou (n 41) 574-575.

sufficient for authorship to arise? Equally, it is not clear how this constitutes authorship under international copyright acquis, as titled by Synodinou, given that the case law and scholarship she refers to before formulating this definition is largely French, US and Australian.[45]

Simone in her account of UK copyright law observes that 'some courts have preferred a negative definition of authorship: not a contribution merely of ideas; not a mechanical contribution to fixation; not interpretation or performance; or not activities akin to proof-reading.'[46] She proposes to conceive of authorship as being 'linked to the act of creativity and that it requires, at least, a more than de minimis contribution of creative choices or intellectual input to the protected expression of a copyright work'.[47] Neither this conception specifies the proximity of intellectual input and subject matter.

Professor Hugenholtz and Quintais make a similar conclusion on EU copyright law: 'the core issue is whether the AI-assisted output is the result of human creative choices that are "expressed" in the output'.[48] They take *Painer* as a model case and distinguish the following phases of the creative process: '"conception" (design and specifications), "execution" (producing draft versions) and "redaction" (selecting, editing, refinement, finalisation).'[49] They argue that 'the role of human authors at the conception stage often remains essential. Moreover, in many instances, human beings will also oversee the

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45 In its final form, Synodinou's authorship definition closely resembles Ginsburg's mainly French and US mix in Ginsburg (n 17).

46 Daniela Simone, *Copyright and Collective Authorship* (CUP 2019) 26.

47 ibid 29.

48 Bernt Hugenholtz and João Quintais, 'Copyright and Artificial Creation: Does EU Copyright Law Protect AI-Assisted Output?' (2021) 52 IIC 1190.

49 ibid.

redaction stage. Depending on the facts of the case, this will allow human beings sufficient overall creative choice.'[50]

This conception of authorship or originality based on the overall creative choice does not seem to be satisfactory either. That is because with the use of AI-driven systems, there is no guarantee to what extent the overall creative choice is determinative of the expressive elements and indeed reflecting the personality of the author. The objection against *Painer* as to its listing the high-level choices as relevant is pertinent to the Hugenholtz and Quintais' argument as well. Equally, the input that typically comes in only in the phase of redaction does not qualify for an authorial contribution like editorial corrections or beta-testing of a software do not.[51]

Some of the above conceptions focus on quality and quantity of contributions, some on the phases of process of creation, some on the causal link and the proximity in the sense of who did the last executive steps. But none of these conceptions seems to be comprehensive enough to cover all the necessary aspects of creation. The argument presented here is that the new conception of authorship will need to be more robust to capture the complexity brought by AI-driven systems to the processes of creation.

4 AUTHORSHIP IN POSITIVE LAW

4.1 United Kingdom

Pursuant to the Copyright, Designs and Patents Act 1988 ('CDPA'), s 9, authors are not only persons who created the work but also producers (of a sound recording, a film),

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50 ibid.

51 See the case law on authorial contribution below. Summed up in *Kogan v Martin* [2019] EWCA Civ 1645, [2020] FSR 3 [53].

principal directors (of a film as a cinematographic work), makers of broadcasts and publishers of typographical arrangements of a published edition. If authorship were to be abstracted from this group of persons and activities in which they engage, then the resulting conception would have wobbly contours.

The pragmatic purpose of having such a colourful group of authors in section 9 is revealed upon its systematic reading in conjunction with section 11 of the CDPA pursuant to which the first copyright owner of an authorial work shall be its author.[52] In the light of section 11, the author from section 9 looks like a mere legislative abbreviation to serve the purposes of section 11 of the CDPA. Sections 9 and 11 of the CDPA materialise the risk against which Dietz warned us, ie the confusion of the author – creator with the author as the first person entitled to copyright. Since the focus of this chapter is on authorship of authorial works rather than the use of the term 'author', there is no need to dwell for too long on this particular legislative technique used in the CDPA.

In relation to authorial works, the object of interest of the present thesis, the CDPA defines the author as the actual creator of the work.[53] In the (legislatively) exceptional case of authorial works created in the course of employment,[54] the first copyright owner is the employer instead of the author. Nonetheless, in this case too, the first copyright owner's rights depend on the existence of the author-creator (the employee).

What the creation of an authorial work or the making of authorial contribution entails can be abstracted from case law on joint authorship.[55] The kind of authorial contribution required for joint authorship can be a telling indication of what is required from a sole

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52 CDPA, s 11(1).

53 CDPA, s 9(1).

54 CDPA, s 11(2).

55 CDPA, s 10(1). *Kogan v Martin* (n 51) [53].

author to create a work. In *Kogan v Martin*,[56] the Court of Appeal gave an authoritative interpretation of joint authorship. In that case, the question was whether Ms Kogan and Mr Martin created the screenplay in joint authorship. For this thesis, only the parts of the judgment concerning and defining authorial contributions are relevant. The authorial contributions were formulated as follows:

i. design as to work's conception (creating 'its general outline'[57]) and materialisation ('shar[ing] the labour of working it out'[58]),

ii. sufficient amount of intellectual input contributed directly to the creation of the work ('a significant amount of the skill which went into the creation of the work'[59]; '[t]he statutory concept of an author includes all those who created, selected or gathered together the detailed concepts or emotions which the words have fixed in writing.'[60]) and

iii. the authorial quality of the intellectual input which depends on the type of work ('[w]hat counts as an authorial contribution is acutely sensitive to the nature of the copyright work in question'[61]; and it is to be assessed using the 'Infopaq test, i.e. whether the putative joint author has contributed elements which expressed that person's own intellectual creation'[62]).

After the Court of Appeal ordered a retrial for the case, the High Court delved more into the evidence on the process of creation to determine, inter alia, whether Ms Kogan made

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56 *Kogan v Martin* (n 51).

57 ibid.

58 ibid.

59 ibid.

60 ibid.

61 ibid.

62 ibid.

any authorial contribution. More specifically, the court was ordered to look at the process of creation of the first three drafts of the screenplay (provided Ms Kogan accepts that she did not contribute significantly beyond the third draft).[63] It would be enough for Ms Kogan to claim joint authorship if she 'had made sufficient relevant contributions up to the third, or the sixth draft, and these carried through into the film.'[64] From this it follows that an authorial contribution must make it from the conception to materialisation of the final result.

For the High Court, Justice Meade first acknowledged that as the creative process was happening in private spheres of the aspirant authors and in addition to that during their romantic relationship, there will naturally be less evidence recorded in documents.[65] Regardless of that, he ought to take into consideration all the evidence, including witnesses' statements tainted by fallibility of memory.[66]

Then he went chronologically through the process of creation and interactions of Ms Kogan and Mr Martin. Based on his findings regarding the process of creation, he was able to determine when the core of the screenplay (or its identity so to say) was formed.[67] Since the work in question was a screenplay for a musical, a lot of that identity consisted of 'musicality': 'the sense is very much that Ms Kogan had and used an ability to exploit musicality as part of the plot and the characterization.'[68] The main contributions made by Ms Kogan were found to lie in 'characterisation, musicality, choice of historical incident

63 ibid [146].

64 ibid [22].

65 *Martin v Kogan II* [2021] EWHC 24 (Ch) [2021] FSR 10 [48].

66 ibid [45].

67 The beginning of 2012 was found to be 'a critical time in the creation of FFJ when the characters and key plot events were being shaped.' ibid [150].

68 ibid [241].

and musical terminology'.[69] It transpires from the High Court judgment that musicality served as a useful proxy and the contributions resting on musicality were likely to be attributed to Ms Kogan (in joint authorship), including the idea to use FFJ's life as a motive for a movie.[70]

For the purposes of this chapter, it would have been helpful, had it been openly acknowledged by the court that according to its findings Ms Kogan had a musicality personality (or identity) and Mr Martin did not and that the court was indeed led by the musicality personality and its reflection in the work. This could be supported by the Mr Martin's own reaction to the Ms Kogan's idea of joining him in writing. 'Ms Kogan commented that she had been writing since she was three, and he replied that he'd been singing since he was three, so perhaps he should join her on stage.'[71] As he did not regard her as a writer with a writing personality, so did he not regard himself as a musician with a musicality personality. Hence, if asked, Mr Martin would have likely agreed that the musicality contained in the screenplay could not be attributed to Mr Martin' personality but to Ms Kogan's or someone else's.

Another downside of the case was that it did not reason why the particular contributions were of authorial character.[72] Additionally, it was not clear why the Schedule to the Order prepared by Birss J prompted the court to answer the questions of whether the contributions are of authorial character and whether the contributions were an expression of her own intellectual creation separately. These imperfections notwithstanding, for the

69 ibid [272].

70 ibid [107].

71 ibid [154].

72 This was not necessary given, the other party had accepted it. ibid [319].

present purposes the case is valuable in showing the way in which the story of authorship can unfold when the emphasis is put on the process of creation.

Case law on joint authorship preceding *Kogan v Martin* mostly fits into the framework given by the Court of Appeal. In *Cala Homes* the court allocated joint authorship in architectural drawings for a contribution in the form of information concerning design features conveyed verbally or by means of sketches next to contribution of skill and expertise in drawing:

> It is wrong to think that only the person who carries out the mechanical act of fixation is an author. There may well be skill and expertise in drawing clearly and well but that does not mean that it is only that skill and expertise which is relevant.[73]

The authorial contribution 'must be in the nature of originating and creating something that finds its way into the finished work'.[74]

In another relatively recent case, *Fisher v Brooker*, the House of Lords affirmed that composing a memorable organ solo at the beginning of the work, and an organ melody which is a counterpoint throughout most of the whole length of the work was significant enough to amount to an authorial contribution.[75]

In relation to a musical work, 'develop[ing] and fix[ing] in [author's] musical consciousness the melody, the chords, the rhythm and the general structure of the song from beginning to end as well as the lyrics'[76] counts as authorial contribution whereas mere singing and playing instruments by other members of a band in their own creative ways did

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73 *Cala Homes (South) Limited v Alfred McAlpine Homes East Limited (No 1)* [1995] FSR 818 (Ch), [1995] 7 WLUK 62, 835.

74 ibid 834.

75 *Fisher v Brooker* [2009] UKHL 41, [2009] FSR 25 (2009).

76 *Hadley v Kemp* [1999] EMLR 589 (ChD), [1999] 4 WLUK 377, 591.

not. The distinction was drawn between 'composition or creation of a musical work on the one hand and performance or interpretation of it on the other'.[77]

That the line between creating and interpreting can be difficult to draw follows from *Sawkins v Hyperion*.[78] Mr Sawkins helped to interpret a musical work of another by adding or modifying a figured bass line in two compositions and re-creating missing viola parts in respect of a half of another's composition with the intention to preserve the identity of another's work.[79] This was considered as an authorial contribution because it produced 'sufficient aural and musical significance to attract copyright'.[80]

In contrast with restoration and editing of a musical work, the skill, time and effort invested into ensuring that the software performed the way it was supposed to, ie a beta-testing activity, did not substantiate claims of authorship.[81] Though the activity of testing software certainly contributes to improvements of the software and requires an intellectual activity, the court did not consider it as a software creating activity.[82]

Historical cases show that a mechanic executive activity was sufficient for claiming authorship. In *Walter v Lane* the House of Lords found sufficient and even 'considerable intellectual skill and brain labour beyond the mere mechanical operation of writing'[83] in the activity of taking notes 'in shorthand, word for word, transcrib[ing] them verbatim in longhand, carefully correct[ing] and revis[ing] and punctuat[ing] them'.[84]

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77 ibid 646.

78 *Sawkins v Hyperion Records Ltd* [2005] EWCA Civ 565, [2005] 1 WLR 3281.

79 ibid [21]-[26].

80 ibid [56].

81 *Fylde Microsystems Ltd v Key Radio Systems Ltd* [1998] FSR 449, [1998] 2 WLUK 20.

82 ibid.

83 *Walter v Lane* [1900] AC 539 (HL) 556.

84 ibid.

Somewhat similarly to *Walter v Lane,* in *Cummins v Bond,* despite the plaintiff not claiming authorship of ideas nor expressions of ideas in a manuscript, she was awarded copyright for her own, very speedy and tiresome automatic writing—'over 2000 words in an hour and a half without any pause'.[85] In this connection, current commentators are confident that 'the general principle that an original literary work (other than a database) requires no act of the imagination and no intellectual skill beyond that of knowing how to read and write remains true'.[86]

Walter v Lane was embraced in recent *Sawkins v Hyperion* as still good law with the bridge between them being the effort, skill and time the shorthand writer spent in correcting and editing another's speech and the effort, skill and time Mr Sawkins spent in editing another's compositions. Contrary to the Court of Appeal in *Sawkins v Hyperion*, Lord Justice Arnold finds *Walter v Lane* still good law but only in respect of the need to identify the work and all of its constituent elements that affect its perception (but not in respect of authorship).[87]

Whilst not explicitly acknowledged by the courts in *Walter v Lane*, *Cummins v Bond* and *Sawkins v Hyperion*, the other shared element of these cases is they were not joint authorship cases. In each of these cases the plaintiffs were standing against defendants with no creative connection to the works whatsoever. Persons with creative inputs and possibly stronger authorship claims than the plaintiffs themselves either did not (Lord Rosebery in *Walter v Lane*) or could not (an external psychic agent in *Cummins v Bond*, an ancient musician Lalande in *Sawkins v Hyperion*) claim authorship. These cases hence skewed

85 *Cummins v Bond* [1927] 1 Ch 167, 168.

86 Laddie, Prescott and Vitoria (n 10) 3.55.

87 Richard Arnold, 'Walter v Lane revisited (again)' (2021) 2 IPQ 67.

authorship towards mechanical activities or skills and lowered the authorship standard. For this reason, this article treats these cases as less significant.

To summarise the above case law, but chiefly *Kogan v Martin*, *Cala Homes* and *Fisher v Brooker* to make an authorial contribution a person is required to take part in the intellectual conception of the expressive elements of a work, in bringing the work into existence and determining its identity. The assessment of authorial contribution begins with identifying the relevant activity relative to the nature of the copyright work (*Kogan v Martin*) and proceeds to evaluation of evidence concerning the process of creation (*Martin v Kogan II*).[88]

4.2 France

The French Intellectual Property Code does not provide for a general requirement of human authorship. Nonetheless, legal scholars are united in referring to a principle that a natural person who created the work is necessarily its author and *ab initio* entitled to author's rights.[89] In the Dalloz commentary, one of the first sentences states that 'author's rights are creators' rights'.[90]

An author enjoys exclusive author's rights attached to the work on the basis of its creation.[91] The status of author is dependent on the act of creation and not the will of

88 *Martin v Kogan II* (n 65).

89 Christophe Caron, *Droit d'auteur et droits voisins* (6th edn, LexisNexis 2020) 179. André Bertrand, *Droit d'auteur* (3rd edn, Dalloz Action 2010) 181. Michel Vivant and Jean-Michel Brugière, *Droit d'auteur et droits voisins* (3rd edn, Dalloz 2016) 313.

90 Pierre Sirinelli and others, *Code de la propriété intellectuelle : annoté & commenté* (21st end Dalloz 2021) 12.

91 Code de la propriété intellectuelle (Loi n° 92-597 du 1er juillet 1992 relative au code de la propriété intellectuelle, as amended as of 26 novembre 2021) ('French Intellectual Property Code') art L111-1.

parties.[92] Pursuant to article L 111-2 of the French Intellectual Property Code, '[a] work is deemed created, regardless of whether it is published, due to the fact of the bringing into being, even if incomplete, of the conception of the author.'[93] The act of creation giving rise to author's rights is understood as 'an intervention of a human being that is necessarily conscious and modifies the reality.'[94] Therefore, for instance, undertaking an excavation and finding an object of art does not make the person who found it its author.[95]

Similarly, the Court of Appeal in Paris found that a language researcher who collected and transcribed Cajun words and folklore songs did not merit author's rights over these subject matter.[96] In case where the process of restoration of a work 'implies the most strict fidelity to the image and the spirit of the original work […and the restorer] did not try to modify the plan, arrangement, compostition of the preceding work',[97] the restorer does not gain the status of author.

The French Intellectual Property Code does not provide what a person must do to become an author. However, in specific cases, such as in relation to a composite work, it states that it 'is a property of the author who brought it into being […]'.[98] Or, an audiovisual work is authored by 'a person or persons who bring into being the intellectual creation of that work'.[99] From the case law it follows that an author must make a relevant contribution

92 André Lucas, Agnès Lucas-Schloetter and Carine Bernault, *Traité de la propriété littéraire et artistique* (5th edn, LexisNexis 2017) 169.

93 French Intellectual Property Code, art L 111-2.

94 Christophe Caron, *Droit d'auteur et droits voisins* (5th edn, LexisNexis 2017) 56.

95 Lucas (n 92) 69.

96 Cour d'appel de Paris, Decision of 14 January 1992 (1992) 152 RIDA 198.

97 TGI de Paris, Decision of 5 October 1994 (1995) 163 RIDA 205.

98 French Intellectual Property Code, art L113-4.

99 French Intellectual Property Code, art L113-7.

in the process of creation of the work. The relevance appears to depend on the activity necessary for creation of the form of the work and its distance from the final form.

For instance, a chef was not found to be a co-author of an audio-visual work which documented him cooking because he did not manage to assert and prove how he contributed to the intellectual operations of conceiving, shooting and editing the audio-visual work itself.[100] Similarly, the fact that a painter and his creative process of painting was a subject of a film did not earn him the status of joint author and this did not count as a relevant personal contribution to the creation of the film.[101]

Again, in a documentary making scenario, an artist supplied information about his life and directly contributed to dialogues for a film about the life of young people in Paris. Moreover, he brought witnesses who testified to his contributions to the dialogues and how he corroborated with the maker of the documentary. However, the court did not find these contributions to be specific and concrete enough in comparison to a contribution in 'a determined form such as a screenplay in writing, or a direct intervention into shooting of the film with a personal power to make decisions'.[102]

In relation to a literary work, a study of oligoelements deficiencies in ruminants was found to be marked by the personality of those who have realised the synthesis of the scientific knowledge in the field. The court found that the author made a personal synthesis of the collected pieces of information and assumed editing of the synthesis. The aspirant joint author only provided input in the form of collecting sources and giving consultation

100 Cour de cassation, Decision of 5 February 2002 (2002) 193 RIDA 373.

101 Cour de cassation, Decision of 3 November 1988 (1989) 142 RIDA 299.

102 Cour d'appel de Paris, Decision of 16 January 1992 (1992) 152 RIDA 204.

in the editing phase without impairing the creative freedom of the author and therefore was not recognised as joint author.[103]

Contribution towards conception but not the other stages of the process of creation was found insufficient in the following case. The aspirant joint author intervened into conception of renovation of a place, he gave no evidence of his personal contribution toward realisation (bringing into being) of the plans or sketches or that he would have given precise instructions (as to the realisation).[104]

That the author-creator's personality must from conception to realisation of the work and be perceivable in the final result was confirmed in *Guino v Renoir*.[105] A sculptor made a few sculptures with his own hands on the basis of original paintings of his teacher. The teacher also initiated and directed the creation of the sculptures and assumed their divulgation under his name. However, the teacher could not and did not intervene in the execution of those sculptures. The Supreme court reasoned that the underlying sculptures reveal that 'certain postures, certain expressions were accepted and not dictated [by the teacher] and [they] mark an imprint of the personal creative talent [of the sculptor] and lastly the sculptures would have been different had they been [created] solely by [the teacher].'[106] It finally instructed the lower courts to reason and provide factual findings as to the personal imprint as well as the work's distinctiveness in comparison with other works. This suggests that the distinctiveness may be a secondary indication for, and a side-product of, the author's personal imprint given to the work in the process of its creation.

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103 Cour d'appel de Paris, Decision of 20 April 1989 (1990) 143 RIDA 317.

104 Cour d'appel de Paris, Decision of 20 November 1996 (1997) 173 RIDA 321.

105 Cour de cassation, Decision of 13 November 1973, n° 71-14.469.

106 ibid.

It follows from the French case law that the author must engage in an activity necessary for creation of the work which must be made already in the conception phase and remain perceivable even if another intervenes in the same kind. But if another intervenes in the same kind, the authorship of the mastermind cannot cover the whole of the work. Inputs count as authorial if they are precise, concrete and durable enough to determine the expressive elements. The precision and specificity of instructions warranting authorship can be a useful discriminator because AI-driven systems tend to be given only high-level, imprecise instructions as to the expressive elements of the result. The activity must, too, involve making personal decisions and be relevant in relation to the work, ie not like cooking in relation to making a film or collecting data and editing in relation to writing an article.

4.3 Germany

The purpose of author's rights is to 'protect the author with respect to their intellectual and personal relationship to the work and the use of the work'.[107] The initial beneficiaries of author's right are their authors. In theory, the author's rights are not transferrable.[108] A juridical person may become an owner of the rights to use the work (solely the economic rights) upon a transfer of those rights. No authorship of a juridical person is conceivable. For instance, even if a juridical person maintains satellites that made photographs it does not have the right to be named as author on the published version of the photographs.[109]

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[107] Urheberrechtsgesetz of 9 September 1965 (BGBl. I S. 1273), as amended by the statute of 28 November 2018 (BGBl I S 2014) ('German Author's Rights Act') § 11.

[108] Ulrich Loewenheim, '§ 10 Der Urheber A. Der Werkschöpfer' in Ulrich Loewenheim (ed), *Handbuch des Urheberrechts* (2nd edn, CH Beck 2010) [3].

[109] *Satellitenfoto*, Decision of 30 May 1989, 16 O 33/89 [1990] GRUR 270.

An employee remains the person entitled to author's rights in relation to works they create in their employment and hence the rights to use the work must be granted to the employers which may happen also tacitly.[110] It follows that there is no works-made-for-hire doctrine recognised under the German author's rights regime with the statutory exception of computer programs in relation to which the initial rights to use them are enjoyed by the employers.[111] Moreover, according to Professor Grünberger, there is established case law of the German Supreme Court regarding remuneration of authors, ie that 'the author is to be granted an appropriate share in the profits from every economic exploitation of the work'.[112]

Pursuant to § 7 of the German Author's Rights Act, the author is the creator of the work. As a commentary puts it, the creator is understood to be the natural person who made the work through their personal intellectual performance.[113] Making a work does not require finishing it, it is only required that the first authorial contributions to the work are brought about.[114] The ideas and instructions can count as authorial contributions as soon as they are so concretised that they constitute a personal intellectual creation.[115]

More specifically, in *Buchhaltungsprogramm*, the Supreme Court held that a contribution made in the preparatory stage can be considered as authorial if it is 'a creative contribution to the integrated creative process of completing the work'.[116] A computer

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110 ibid.

111 Michael Grünberger and Adolf Dietz 'Germany' in Lionel Bently and Burton Ong (eds), *International Copyright Law and Practice*, vol 2 (annually updated, Lexis Nexis 2020) §4[1][b].

112 ibid §1 [2].

113 Dorothee Thum, 'UrhG § 7 Urheber' in Artur-Axel Wandtke and Winfried Bullinger, *Praxiskommentar Urheberrecht* (5th edn, CH Beck 2019) [1]. Schulze (n 43) [2].

114 ibid [9].

115 ibid [23].

116 *Buchhaltungsprogramm*, Decision of 14 July 1993, I ZR 47/91 [1994] GRUR 39.

program for foreign currency book keeping 'in the form of a direct display on the screen (without the need to go into sub-menus) was regarded as original and creative; the manner of the incorporation was good and surprising and in its chosen form of realisation it presents an above-average performance.'[117]

When formulating the specification for that computer program, a client (a company dealing with data organisation and processing) gave instructions for development of the program to a software company, including particular steps to be taken to broaden the scope of data processing, conduct plausibility checks and evaluation at certain points. The software company translated these requirements into a computer language. The client also contributed by structuring the data and preparing a special balance sheet structure so that it could be directly incorporated into the computer program.

Contributions towards methods of data processing implemented in the computer program merited joint authorship in the computer program[118] despite being towards general ideas. More recently though, the Higher Court in Köln found that a mere assignment to create software and giving specifications to that end without the actual coding does not make one a joint author of the resulting computer program.[119]

In contrast to the above decision of the Supreme Court, from a more recent case from Köln, it flows that mere assignment to create software and giving specifications to that end without the actual coding makes one no joint author of the resulting computer program.[120]

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117 ibid.

118 ibid.

119 *Entwurfsmaterial* decision as found in Gernot Schulze, 'UrhG § 8 Miturheber' in Thomas Dreier and Gernot Schulze (eds), *Urheberrechtsgesetz* (6th edn, CH Beck 2018) [8].

120 Gernot Schulze, 'UrhG § 8 Miturheber' in Thomas Dreier and Gernot Schulze (eds), *Urheberrechtsgesetz* (6th edn, CH Beck 2018) [8].

Interestingly, the standard of authorial contribution changes for persons who were named as authors upon work's publication. Then, that person's contribution does not need to be of strictly authorial quality. As the Supreme Court held in *Kranhäuser,* even a marginal creative contribution to a common work, if such a contribution is not divisible from the whole, merits joint authorship.[121] Hence, to challenge joint authorship of someone who enjoys presumption of authorship, it needs to be proven that that presumed author made only 'entirely irrelevant creative contributions'[122] in the relevant process of creation (in *Kranhäuser* this was circumscribed to activities within a workshop).[123] In *Kranhäuser,* the challenged author enjoying the presumption of authorship sustained their position because they contributed 'linear structures spanning over the Rhein basin'[124] to the common architectural design and these contributions fell within the art of city development planning.

Contributing mere ideas or suggestions does not suffice to establish joint authorship. For instance, giving an idea of creating an animated pink elephant character for an advertisement campaign does not constitute a personal intellectual creation.[125] Further typical non-authorial contributions are activities (although intellectual but not regarded as creative) that consist of auxiliary activities done under precise instructions of authors such as gathering, filtering and arrangement of the raw material for creation.[126]

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121 *Kranhäuser,* Decision of 26 February 2009, I ZR 142/06 [2009] GRUR 1046.

122 ibid 1047.

123 ibid.

124 ibid.

125 *Rosaroter Elefant*, Decision of 19 October 1994, I ZR 156/92 [1995] GRUR 47.

126 Thum (n 113) [30].

4.4 De Facto Absence of Author-Creator

Disputes over joint authorship arise if there are at least two persons claiming authorship. This enables to assert, prove or challenge authorship in parties' testimonies and other evidence. In the *de facto* absence of an author-creator, there seems to be no person entitled to challenge usurpation of copyright by a non-author. Moreover, there are statutory presumptions of authorship which may cover up for absence of the author-creator. If 'a name purporting to be that of the author appeared on copies of the work as published or on the work when it was made, the person whose name appeared shall be presumed, until the contrary is proved, to be the author of the work'.[127]

Consequently, if authors as they appear are not challenged, as it may happen in the case of expressive human-AI productions, the actual authorship may not end up being scrutinised by courts or public.[128] If the statutory presumption of authorship operates to the effect that the named person is treated as the actual author of the work in question, this feeds back a belief that the work in question was indeed created by a human being.

In France, a presumption to the same effect is in operation.[129] Above and beyond the presumption of authorship, if a juridical person wants to claim copyright it must prove the transfer of the title to do so.[130] There are transfers that have as their legal basis the text of the French Intellectual Property Code, ie transfers in favour of employers in relation to

127 CDPA, s 104(2).

128 Abbott also mentions this: '[t]he issue of authorship or inventorship of a CGW [computer-generated works] may not arise until litigation, and even that is unlikely.' Ryan Abbott, 'Artificial intelligence, big data and intellectual property: protecting computer generated works in the United Kingdom' in Tanya Aplin (ed), *Research Handbook on Intellectual Property and Digital Technologies* (Edward Elgar 2020) 325.

129 French Intellectual Property Code, art L113-1.

130 Cour de cassation, Decision of 17 March 1982, JCP G 1983.

computer programs created by their employees,[131] the state in relation to works created by state officials[132] and publishing houses in relation to works created by journalists.[133] No common overarching reasons for selection of these particular transfers are referred to in the scholarship. They seem to have been introduced ad hoc for better work exploitation purposes, in public interest or as a result of lobby.[134]

A work made for hire doctrine is strange to French author's rights law, but courts have accepted that employers should benefit from an implicit licence to enjoy certain economic rights in relation to works created by their employees.[135] This practice is contested, however, in particular in the light of the provision of the French Intellectual Property Code stating that 'a global transfer of future works is null'.[136]

Paying lip service to the creator doctrine, French courts recognise juridical persons as the copyright owners without requiring them to furnishing evidence of the transfer. They rely on a statutory presumption of authorship stating that the '[t]he status of author belongs, unless the contrary is proven, to the person or persons under whose name the work was published.'[137] It is now an established practice that the courts (though refraining from calling a juridical person an author) acknowledge original entitlement of juridical persons not only to economic rights but also moral rights, including the right to publish the work under their name.[138] An argumentation more in want of sense can hardly be imagined. By

131 French Intellectual Property Code, art L113-9.

132 ibid, art L131-3-1.

133 ibid, art L132-36.

134 Vivant and Brugière (n 89) 324. Frédéric Pollaud-Dulian, *Le droit d'auteur* (2nd edn, ECONOMICA 2014) 286.

135 Vivant and Brugière (n 89) 323-324.

136 French Intellectual Property Code, art L131-1.

137 ibid.

138 Vivant and Brugière (n 89) 313.

publishing a work under its name, the juridical person gains rights to publish the work under its name. This resembles money laundering in having an object of not the right origin and running it through a certain scheme at the end of which an object with a tolerable origin emerges.

As already observed above, in Germany the statutory presumption of authorship puts its beneficiaries into a strong position (*Kranhäuser*) whereby proof of the contrary is required to strip a presumed author of the authorship status. Though it is enough to prove that the presumed author is not the real author, and the real author does not have to be indicated, this still requires considerable knowledge of the process of creation to bear the burden of proof with success. The presumption of authorship is effective only with respect to the person of author (should the work meet copyright subsistence criteria) but it does not warrant copyright protection.[139] In a case discussing possible protection of photographs taken by a satellite, the court held that the author in the general sense as well as the author of a photograph specifically, can be only a natural person since only they 'possess the personal and intellectual capabilities to create a work'.[140] The court also added that if a juridical person wishes to claim author's rights in works they can do so only on the basis of a transfer of rights from the creator of the work, or in this case, the photographer.

From the above analysis of the cases follows that if a natural person in the role of author is absent, it is not the courts who would miss them or become concerned about their absence. To what extent the authorities tend to connect the dots of authorship, the absence of author and originality as a copyright subsistence criterion will be analysed in Chapter VII.

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139 *Coverversion*, Decision of 11 December 1997, I ZR 170/95 [1998] GRUR 376.

140 *Satellitenfoto*, Decision of 30 May 1989, 16 O 33/89 [1990] GRUR 270.

4.5 Authorship and Copyright Subsistence Criteria

As already mentioned above, authorship and originality can be regarded as synonymous.[141] Professor van Eechoud refers to 'the twin concepts of authorship and original work'.[142] Or, Ramalho concludes, after analysing authorship in the US, EU and Australia, that authorship is intertwined with requirements for protection 'in a way that the former appears to be embedded in the latter'.[143] Simone, too, acknowledges the connection: '[i]t is an original contribution that makes a contributor an author.'[144] Synodinou joins the company by calling the connection 'the thorny relationship between authorship and originality'.[145]

Looking at the problem from an object-centric perspective, Professor Pila understands an authorial work as 'an expressive production of an author' and thus 'having a certain history of production'.[146] She identifies two definitional elements of a subject matter eligible for EU copyright: intangibility and 'origination in an act of human creation'.[147] Professor Hugenholtz describes the connection from the angle of the work too: 'Without a "work" there is no author and there are no exclusive rights.'[148] One may wonder whether this is any similar to the chicken and the egg problem. It the view presented in this thesis, it should not be because in fact the creator originates the work and not vice-versa. It

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141 Ginsburg (n 17) 1078.

142 Mireille van Eechoud, 'Voices near and far. Introduction' in Mireille van Eechoud (ed), *The Work of Authorship* (Amsterdam University Press 2014) 7.

143 Ana Ramalho, 'Will robots rule the (artistic) world? A proposed model for the legal status of creations by artificial intelligence systems' (2017) 21 J Internet L 1, 12.

144 Simone (n 46) 20.

145 Synodinou (n 41) 577.

146 Justine Pila, *The Subject Matter of Intellectual Property* (OUP 2017) 148.

147 ibid 9.

148 Bernt Hugenholtz, 'Works of literature, science and art' in Bernt Hugenholtz and others (eds), *A century of Dutch copyright law* (deLex 2012) 34.

is just the law that muddles the waters as it primarily posits the legal requirements for work and sidelines authorship by the statutory presumptions of authorship.[149]

The Berne Convention rightly frames the connection between authorship and copyright subsistence requirements with the author – creator and their creative activity as the starting points. This position is arguable even though the text of the Berne Convention primarily mentions literary and artistic works as productions in a certain domain. Pursuant to Article 2(1) of the Berne Convention,

> [t]he expression "literary and artistic works" shall include every production in the literary, scientific and artistic domain, whatever may be the mode or form of its expression, such as books, pamphlets and other writings; […]; dramatic or dramaticomusical works; choreographic works […]; musical compositions […].[150]

And more specifically, 'collections of literary or artistic works such as encyclopaedias and anthologies which, by reason of the selection and arrangement of their contents, constitute intellectual creations'.[151]

Ricketson and Ginsburg comment that in the context of the Berne Convention, the need for an intellectual creation is implicitly present in the conception of literary or artistic work.[152] They also add that the term 'production' was merely indicating that a subject matter must come into existence before it can be protected.[153] Professor von Lewinski writes that '"production" is understood as something originating from the mind of a person, it is also understood as implying originality or creativity, as reflected in the national laws

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149 Brad Sherman and Lionel Bently, *The making of modern intellectual property law: the British experience, 1760-1911* (CUP 1999) and Chapter VIII.

150 Berne Convention, art 2(1).

151 ibid, art 2(5).

152 Sam Ricketson and Jane C Ginsburg, *International copyright and neighbouring rights: the Berne Convention and beyond*, vol I (2nd edn, OUP 2006) 402-403.

153 ibid.

of Berne union countries, even if not explicitly required by the Berne Convention.'[154] According to these accounts, the intellectual creation by an author-creator or, as some national copyright statutes put it, originality is a necessary, implicit condition for copyright protection under the Berne Convention.

Professor Dreier, too, explains that the Berne Convention 'is concerned with creations in the field of literature and the arts'[155] and this suggests that 'production' is synonymous with 'creation'. Upon appreciating the connection between authorship and copyright subsistence requirements, one realises that if a subject matter does not have any human author, not only there is no one entitled to copyright, but also (and more fundamentally) there is no authorial work eligible for copyright protection.[156]

The starting position of the intellectual creative activity leading to the creation of a work becomes significant in the context of human-AI productions. Some of these results may be found expressive, taking the form of a painting, photograph or musical work as demonstrated in Chapter I. Despite their prima facie indistinguishability from human-authored works, some such results (or some of their copyrightable elements) might not have been authored by a human being. The potential lack of human author and its consequences for copyright subsistence of an expressive subject matter therefore demand a closer scrutiny of the copyright subsistence criteria with a particular focus on reflections of human aspects

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154 Silke von Lewinski, *International Copyright Law and Policy* (OUP 2008) 122-3.

155 Thomas Dreier, 'Berne Convention, art 2' in Bernt Hugenholtz and Thomas Dreier (eds), *Concise European Copyright Law* (2nd edn, Kluwer Law 2016) 15.

156 Similarly in Tanya Aplin and Giulia Pasqualetto, 'Artificial Intelligence and Copyright Protection' in Rosa Maria Ballardini, Petri Kuoppamäki and Olli Pitkänen (eds), *Regulating industrial internet through IPR, data protection and competition law* (Wolters Kluwer 2019): In the context of computer-generated works they write that '[i]f no intellectual creativity has been exerted, then no work warranting copyright protection has been created.' This particular formulation was not adopted here because some human intellectual creativity is usually exerted in creation of a computer generated work, it is just not the authorial intellectual creativity. Here, it is preferred to address the problem as one of a missing author and hence missing human authorial contribution.

in those criteria. This inquiry into the human aspects of copyright subsistence criteria is subject of the next chapter.

4.6 Computer-Generated Works in the UK

The interplay of the author-creator, their absence and originality was not managed well in the UK statutory framework for so-called computer-generated works ('CGW'). The CDPA defines 'computer-generated' as 'generated by a computer in circumstances such that there is no human author of the work'.[157] Then section 9(3) of the CDPA provides that if such a CGW is a literary, dramatic, musical or artistic work, 'the author shall be taken to be the person by whom the arrangements necessary for the creation of the work are undertaken.'[158]

To date, the only CGW positively identified in case law were composite frames created for the purposes (and in the course) of playing a video game. Authorship under section 9(3) of the CDPA was attributed to Mr Jones who 'devised the appearance of the various elements of the game and the rules and logic by which each frame is generated and he wrote the relevant computer program'.[159] Kitchin J rejected the player of the game as the potential author of composite frames under section 9(3) of the CDPA because he has not 'undertaken any of the arrangements necessary for the creation of the frame images. All he has done is to play the game.'[160]

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157 CDPA, s 178.

158 CDPA, s 9(3).

159 *Nova Productions Ltd v Mazooma Games Ltd* [2006] EWHC 24 (Ch), [2006] RPC 14 [105].

160 ibid [106].

The conclusion that player's input was not a necessary arrangement in the sense of section 9(3) of the CDPA can be disputed though.[161] Arguably, but for the activity of playing the game, the frames would not have been created. What is more, but for the way the game was played by a particular player, the frames would not have been created in a manner they were. Therefore, the player seems to have determined the final expression of the frames.[162]

Equally, the input of the creator of the game who was found to be the author under section 9(3) of the CDPA rested mainly in creation of the rules and logic embedded in the computer program that would allow playing the game. His creative activity was towards devising a game and writing a computer program. Those composite frames were just an intermediate component that enabled playing the game. Given their utilitarian nature and the development brought by the *LucasFilm*, it is their qualification as an artistic work that could now be open to challenge in the first place.[163]

In *Express Newspapers*,[164] a set of similar facts, ie copyright subsistence in lottery grids containing twenty-five letters in rows of five generated by a computer, was tried before Whitford J. The creation of the grids consisted of: (i) devising the game so that there are not too many winnings but still enough of them to make the game look attractive,

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161 My point goes to the causation element of the 'necessary arrangements' only. For a more detailed discussion, see Jani McCutcheon, 'Curing the Authorless Void: Protecting Computer-Generated Works Following IceTV and Phone Directories' (2013) 37 Melb U L Rev 46.

162 In addition, the whole decision is confusing as it finds in the paragraph 104 that the composite frames are artistic works and 'were created by Mr Jones or by the computer program which he wrote'. Reading 'or' in the context of the decision, it meant an inclusive disjunction. But then it is far from straightforward how these two can possibly occur at the same time, ie how a subject matter can be deemed to have a human author and not have a human author. Alternatively, the judge left it open whether, as a matter of fact, the composite frames were created by a human author or were a CGW.

163 In *LucasFilm Ltd v Ainsworth* [2011] UKSC 39, [2012] 1 AC 208, the Supreme Court emphasized the importance of the purpose of artistic works in the UK law.

164 *Express Newspapers Plc v Liverpool Daily Post & Echo Plc and Others*, [1985] 1 WLR 1089, [1985] FSR 306.

including checks to avoid frauds[165] and (ii) writing a computer program to generate the grids, an activity which 'could be done, and done without too much difficulty'[166] by the human deviser himself on a smaller scale. Whitford J found the deviser of the game and author of the computer program to be the author of the grids.

Albeit an old law and hardly applicable in the light of the Database Directive,[167] this case recognises a computer as a tool performing an activity of which a human being was intellectually capable but not at the speed and with the efficiency of a computer. Here, the deviser of the game knew exactly what would come out of the computer and was able to check the result against his own.[168] This is a case of computing under precise instructions which should not be mistaken with the use of an AI-driven system (based on neural nets under unsupervised learning for instance) whose modus operandi is often inscrutable and intellectually incomprehensible for their human operators.

This thesis argues that not only in *Nova Productions v Mazooma*, but in general is difficult to apply the CGW provisions convincingly because of their ambiguity. They are ambiguous because they invite at least two distinct lines of argument both of which involve hurdles on the way to copyright protection. The first line of argument assumes CGW constituting works in the sense of the Berne Convention and thus requiring some originality. In contrast, the second line of argument assumes CGW not falling within the concept of 'work' in the sense of the Berne Convention.

First, if section 9(3) of the CDPA when referring to 'literary, dramatic, musical or artistic work' ('LDMA work') in fact refers to 'the rights of authors in their literary or

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165 ibid 309.

166 ibid.

167 Directive 96/9/EC of 11 March 1996 on the legal protection of databases [1996] OJ L 77/20.

168 *Express Newspapers* (n 164) 309.

artistic works'[169] under the Berne Convention, copyright subsistence in a computer-generated LDMA work is pre-conditioned on intellectual creation (or on originality) in the first place. In the UK, an LDMA work is original if it involves author's skill, labour and judgment poured into the activity of creating the given type of authorial work.[170]

To reiterate the connection between the author-creator and originality, in cases where there is no author-creator, there is no authorial (original) work and hence copyright cannot subsist in it, regardless of whether there is a person in whom it could be vested according to the statute. As put succinctly by Bently and others, 'it is difficult to see how the existing criterion of originality, which focuses on the relationship between the author and the work, can be applied to computer-generated works'.[171]

Some argue that CGW 'if otherwise original, should not be denied copyright protection solely because they are computer-generated'[172] or that a CGW should be defined as 'generated by a computer in circumstances such that the computer, if a natural person, would be an author'[173] or 'if the creation of the same work would have required the exercise of a substantial amount of skill, labour, etc. had it been done by a human author, the requirement of originality is satisfied though the work be generated by a computer'.[174]

These accounts basically suggest that a computer should just swap their place with an author-creator. The computer's activity would replace the activity required for originality provided it were of the same kind. This requires us to imagine originality in a

169 Berne Convention, art 1.

170 This follows from *Temple Island Collections Ltd v New English Teas Ltd* [2012] EWPCC 1, [2012] FSR 9 [53], *SAS Institute Inc v World Programming Ltd* [2013] EWHC 69 (Ch), [2013] RPC 17 [52].

171 Lionel Bently and others, *Intellectual Property Law* (5th edn, OUP 2018) 117–18.

172 McCutcheon (n 161) 46.

173 Abbott (n 128) 323.

174 Laddie, Prescott and Vittoria (n 10) 22.44.

work that does not have one because of the lack of human author. Regrettably, Kitchin J did not seem to address this in his finding of copyright in a computer-generated work in *Nova Productions v Mazooma*.[175]

Perhaps, these proposals suggest that a special kind of originality is required in case of these non-authorial LDMA works. This special originality standard could be derived from the legal fiction of authorship in Section 9(3) of the CDPA. As put in the Copinger and Skone James commentary, '[i]t is suggested that the relevant skill and labour is that of the person by whom the arrangements necessary for the creation of the work were undertaken.'[176] The literature offers a range of candidates for a person whose arrangements are necessary: computer designers, datasets providers, investors, operators.

However, in that sense, all of the above activities are necessary arrangements and even more, such as assembling the computer, plugging in the computer, switching the computer on, etc. Had it not been for a person who has built the computer or who has hired the person who had built the computer or who have given the idea of creating a computer-generated work to the person who had hired the person who had built the computer, the computer-generated work would not have existed. For there is no legal definition of the necessary arrangements, there is no legal limitation as to the range of the relevant activities.[177] Even if this was approached as a question of fact and proof, then the chain of causation can be very long and making every but-for-person a person entitled to copyright.

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175 Only 'original skill and labour expended by Mr Jones in devising the appearance and operation of the game' were found. *Nova Productions* (n 159) 246.

176 Nicholas Caddick, Gwilym Harbottle and Uma Suthersanen, *Copinger and Skone James on Copyright*, (18th ed, Sweet & Maxwell, 2021) (vi) Computer-generated works.

177 McCutcheon provides a list of five activities derived from the case law on joint ownership in films. To what extent are activities necessary for making a film are translatable into LDMA categories can be questioned. McCutcheon (n 161) 64.

There are proposals as to selecting the relevant originality and the fictious author of a computer-generated LDMA work on a case-by-case basis.[178] Foremost, this approach does not provide legal certainty as to the rewards and incentives to create which is necessary for copyright to serve its purpose and realise its objectives. Even if these proposals were tenable, there is no good reason or justification for treating unequally persons who conduct the same activity. A person who has an idea of a subject of a painting and instructs an AI-driven system to paint it would be vested in copyright in the CGW, whereas in general, a person who has an idea of a subject of a painting and tells a friend to pain it has no copyright. Is there anything inherently better about instructing a machine what to paint in contrast with instructing a human being what to paint? Vesting copyright in a non-author who merely undertakes arrangements necessary for the creation of an LDMA work is not justified by the property theories supporting the Berne Convention.

The legislative history does not provide satisfactory answers as to the social needs or regulatory problems that the CGW provisions were meant to address. The Whitford Committee saw no issues and understandably, in 1977, the current issues could hardly be anticipated. The Committee recommended to rely on the concept of author and praised 'the simplicity of this approach as giving further support to our decisions against making any other person or persons the author of the output'.[179]

A White Paper that followed a decade later stated that '[i]t appears that no practical problems arise from the absence of specific authorship provisions in this area. The Government has therefore concluded that no specific provisions should be made to

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178 McCutcheon (n 161) 55. Jean-Marc Deltorn, 'Deep Creations: Intellectual Property and the Automata' (2017) 4 Frontiers in Digital Humanities <https://doi.org/10.3389/fdigh.2017.00003> accessed 19 April 2021.

179 House of Commons, *Copyright and Designs Law* (Whitford Report, Cmnd 6732, 1977) [516].

determine this question.'[180] It was added that '[i]f no human skill and effort has been expended then no work warranting copyright protection has been created'.[181]

The good reasons for protecting CGW may be purely instrumentalist, but as in case of classic copyright in LDMA works shows, these may not be sufficient to justify the breadth and strength of the rights currently enjoyed by copyright owners (more in Chapter VIII). Moreover, there are no good reasons for discriminating between authorial LDMA works and computer-generated LDMA works in terms of originality standard.

The second line of argument assumes that the 'literary, dramatic, musical or artistic work' referred to in Section 9(3) of the CDPA 1988 is a special category of subject matter that lies outside the Berne Convention regime. As such, it possibly does not require any originality at all. This position is favoured when one observes the special nature of the regime for CGW, namely the attribution of copyright to a person who makes the necessary arrangements, including taking care of production costs, the duration of copyright[182] and exemptions from moral rights.[183]

In the same vein, Goold calls the provision on CGW unnecessary, and he sees its only purpose if 'we agree that it is not subject to the originality requirement.'[184] He continues that, however, in such a case 'the effect of the provision is to expand protection to non-original CGW. Yet there is no compelling natural rights or utilitarian reason for doing so.'[185] This chapter agrees with Goold in the part that if originality of a CGW is required,

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180 Department of Trade and Industry, *Intellectual property and innovation* (White Paper, Cmnd 9712, 1986) [9.7].

181 ibid [9.8].

182 CDPA, s 12(7).

183 CDPA, s 79(2) and 81(2).

184 Goold (n 3) 129.

185 ibid.

the provisions of CDPA on CGW are nonsense. The reason is that once originality of a work is established for copyright subsistence purposes, then such an original work must, necessarily, have a human author and thereby it cannot fall within the definition of authorless CGW.

In contrast with Goold, this thesis argues that reading the provisions on CGW so that they expand protection to non-original LDMA works is not plausible because such a reading would be inconsistent with the text of section 1(1) of the CDPA. That section provides an exhaustive enumeration of works eligible for copyright protection, ie '(a) original literary, dramatic, musical or artistic works, (b) sound recordings, films or broadcasts, and (c) the typographical arrangement of published editions.'[186] Since it explicitly refers to original LDMA works, upon a systematic reading of the CDPA, it implicitly rules out any copyright protection for non-original LDMA works.

In conclusion, despite the scholarly literature suggesting that provisions on CGW solve the problem of copyright for human-AI productions, this is not the case because those provisions do not address originality satisfactorily. The provisions just incite too many suggestions as to the person in whom copyright is or should be vested which makes them a vehicle for arbitrariness. What is more, since non-original LDMA works are not recognised as copyright eligible works under the CDPA, there is even no basis for speculation as to whether they form a new category of entrepreneurial works or object of neighbouring rights.

[186] CDPA, s 1(1).

5 CONCLUSION

The provisions of the CDPA governing copyright in authorless CGWdo not assist in making an effective distinction between authorless and original (authorial) works. Moreover, the provisions are found to be ambiguous as to the kind of originality which is required in relation to CGW. Regardless of whether these provisions require authorial originality, originality of a special kind or no originality at all, in either case they do not solve the problem they were designed to tackle, ie copyright subsistence in a LDMA subject matter that lacks human authorship. The main take away message from the current UK regulatory approach to CGW and it its application in *Nova Productions v Mazooma* is that it is crucial to have an appropriate method for distinguishing between authorial works (original LDMA works in the CDPA) from other subject matter before one embarks on regulating rights in the latter.

Zooming in on UK authorship, a person is required to take part in the intellectual conception of the expressive elements of a work, in bringing the work into existence and determining its identity. The assessment of authorial contribution begins with identifying the relevant activity relative to the nature of the copyright work (*Kogan v Martin*) and proceeds to evaluation of evidence concerning the process of creation (*Martin v Kogan II*). *Martin v Kogan II* illustrates that if the assessment of authorship adopts a bottom-up approach being driven by the facts, information and evidence of allegedly authorial contributions, aspirant human authors have good prospects.

The French rules on authorship explicitly require author's intellectual input in a certain proximity from the result. From the French law follows that the contributions that are not immediately determinative of the expressive elements of the outcome do not count as authorial contributions, eg an input from an external consultant did not reach the authorial quality because it did not limit the creative freedom of the sole author. Though

not immediately close to the result, instructions as to the execution of a work can count as authorial (*Guino v Renoir*), if they are precise, concrete and durable enough to determine the expressive elements. The precision and specificity of instructions warranting authorship can be a useful discriminator because AI-driven systems tend to be given only high-level, imprecise instructions as to the expressive elements of the result.

The case law on authorship in Germany is varied and it does not seem to assist with sharpening of the contours of the concept of human authorship. From the decisions it follows that a subject matter is authored if the contributions made amount to a personal intellectual creation. The Supreme Court thereby connects authorship and copyright subsistence criteria in such a manner that the whole exercise appears circular. The way out of this circularity used by German courts is described in Chapter VII. As far as delineation of the process of creation is concerned, German law tends to look at individual drafts of the work (*Kranhäuser*). Correspondingly, the process of creation is divided into several phases out of which the drafts arise. If a contribution made in one of the phases determines the final form and can be seen as made within the integrated creative process, it counts as authorial (*Buchhaltungsprogramm*).

As the excursion to the UK, French and German case law on authorial contribution reveals, the authorial contribution must be of certain quality: personal and concrete enough to determine the identity of the work. The process of creation can be perceived as having two phases: conception and execution (the UK), three phases: conception,[187] composition and materialisation (France, as put by Dubois) or phases characterised by creation of individual drafts of the work (Germany). The link connecting the phases is the overarching design (the UK), legacy of author's identity (France) or being part of an integrated creative

[187] The term of conception is vague. One of the ways in which it can be understood is as follows: '[t]he essence of the conception requirement is the formulation of a complete creative plan for the work' Ginsburg and Budiardjo (n 18) 71.

process (Germany). The authorial contribution must occur already in the conception of a work and then flow through composition to the materialisation of the final subject matter. A person whose identity is channelled in an undisrupted legacy from conception, via composition to materialisation of the work itself so that it can be perceived by others can claim authorship.

The decisions and intellectual inputs of a person claiming authorship must immediately determine the protected elements of the expressive subject matter. (In the patent law part, the activity of determining the technical features of the invention was referred to as 'creative' which can also be adopted in the copyright law part.)

At the same time, determining the expressive elements of the work at a high-level and outside the immediate process of creation would fall short of being authorial if the activity (though relevant) is followed by an activity determining the same expressive elements but originating elsewhere. The exception being the German view that these activities could be seen as authorial if forming part of an integrated process of creation.

Other contributions outside the process of creation itself, such as handling data, pre-selection of raw material or supplying mere abstract ideas are traditionally regarded as non-authorial. This clarifies the issues raised in introduction to this chapter, ie whether any person taking part in the process of creation of a work and making intellectual contributions can be regarded as an author. In general, it seems insufficient if a human being is the intellectual grandparent of the work and does not create the work in the sense of immediately determining its expressive elements.

The legacy of author's identity is visible in *Cala Homes, Guino v Renoir* and *Buchhaltungsprogramm.* In these cases, the joint authors guided the execution of the work by precise instructions as to the expressive elements and the executors did not seem to have interfered with respect to these elements. A proof of such a legacy can be traced in the

process of creation. Taking *Martin v Kogan II* as an example, the chronological approach to accounting for events and sensitivity to the context of the process of creation were adopted. It enabled to communicate a clear track record of authorial contribution flowing from conception through composition into materialization.

To recall, in *Martin v Kogan II* the aspirant joint author was let to choose the top contributions that were meant to represent her overall contribution. Then the court decided when the core of the work was made and whether these contributions were made towards the core. Finally, it was important to see whether the contributions to the core of the work made it to the final work (to use the terminology of *Cala Homes*). The final arbiter was identified, but it was not well-articulated that this final arbiter (Mr Martin) barely acted as one with respect to a certain kind of decision, ie decisions based on musicality. Therefore, even more granular approach (going slightly beyond *Martin v Kogan II*) which would zoom in on individual expressive elements, their identity and their origin seems desirable.

CHAPTER VI.
AUTHORSHIP AT THE EU LEVEL

1 INTRODUCTION

This chapter seeks to identify human authorship and its reflections in the copyright subsistence criteria in the EU. This means identifying the normative reflections of the human-specific added value in the process of creation with the view of enabling the distinction between an authorial (original) work and other subject matter.

While the chapter V. looked at the relationship between the author and their work from the perspective of the author, this chapter will approach it from the angle of the work. In case of EU copyright law, this is not only a question of methodology but also necessity because, in contrast to the national laws of the UK, France and Germany, EU copyright law contains no general definition of an author. The explanatory memorandum to the InfoSoc Directive does not explain why. It only mentions that '[i]t is the environment in which works and other subject matter are being created and exploited which has changed—not the basic copyright concepts'.[1] This suggests the stability of the basic concepts, presumably of author and work, vis-à-vis the changing creative and exploitative practices.

In the absence of a statutory definition of author, the copyright subsistence criteria stemming from directives and CJEU's case law are analysed in attempt to distil the essence of human authorship. This chapter offers an original reading of a part of the *Infopaq* decision which allows seeing the human aspects of creation in the copyright eligible subject matter. It is argued that 'presupposes' from the CJEU's reasoning 'the protection of certain

[1] Proposal for a European Parliament and Council Directive on the harmonization of certain aspects of copyright and related rights in the Information Society of 10 December 1997, COM(97) 628 final 97/0359 (COD).

subject-matters as artistic or literary works presupposes that they are intellectual creations'[2] should be read as a pre-condition. Under such a reading, it is argued that a subject matter must be primarily an intellectual creation and only by virtue of being an intellectual creation, constitutes a literary, scientific or artistic work in the sense of the Berne Convention.

Though this chapter analyses the CJEU's jurisprudence on the concept of work, the present chapter does not attempt to propose a new conception of work under the InfoSoc Directive nor offer a constructive critique of the CJEU's decisions as far as creative freedom and idea-expression dichotomy are concerned. It thus does not delve into the CJEU's reasonings of whether, in principle, an 11-word extract (*Infopaq*) or a football game (*FAPL*) provide enough creative freedom to constitute works. Those parts of *Infopaq*, *FAPL* or other judgments that turn on which elements are deemed literary or artistically expressive are not significant for the purposes of this chapter. It is accepted that if a football game as such does not attract copyright it would not do so regardless of whether it would be played by an AI robot or a human being.

Rather, the mission here is to find an appropriate method to detect whether subject matter that are human-AI productions constitute authored works. This is to be done through the focus on identifying and emphasising the exclusively human aspects of the copyright subsistence criteria. This chapter shows that human aspects of authorship are reflected in the personal nature of the free and creative choices. It is further proposed that in the future the personal nature of choices (or the author's own choices) should carry more weight in the copyright eligibility assessment than the creative freedom or creative nature of choices

[2] Case C-5/08 *Infopaq International A/S v Danske Dagblades Forening* [2009] ECR I-6569, EU:C:2009:465, para 34.

because an advanced AI-driven system is often capable of exploiting the former by making the latter.

Moreover, this chapter argues that the CJEU laid a solid foundation for developing an EU-wide definition of human authorship as it calls the reflection of author's personality to be the necessary and sufficient condition for protection in *Cofemel*. The importance of *Cofemel* resting in shrinking the copyright subsistence criteria into two: one formal (identifiability with sufficient precision and objectivity)[3] and one substantive (reflection of the personality of its author)[4] has not attracted much scholarly attention.

Lastly, this chapter argues that in *Cofemel* and *Brompton Bicycle* the CJEU indicated that author's own choices and reflection of their personality can manifest themselves more reliably in the process of creation of the work than in the work itself. It is proposed that this trend should be followed in the future because it can prove instrumental in making the distinction between an authorial (original) work and other subject matter.

2 COPYRIGHT ELIGIBLE SUBJECT MATTER

The common ground for interpretation and application of copyright subsistence criteria in each EU Member State is laid down in directives. More specifically, EU copyright law is a primary source of copyright subsistence criteria for certain types of work, namely computer programs and databases. The respective directives (or parts thereof) are *lex specialis*[5] in relation to the general Infosoc Directive.[6]

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3 Case C-683/17 *Cofemel – Sociedade de Vestuário SA v G-Star Raw CV* [2019] EU:C:2019:721, para 32.

4 ibid para 30.

5 Case C-128/11*UsedSoft GmbH v Oracle International Corp* [2012] EU:C:2012:407, para 51.

6 Directive 2001/29/EC of 22 May 2001 on the harmonisation of certain aspects of copyright and related rights in the information society [2001] OJ L 167/10 ('InfoSoc Directive').

It follows that, under the EU copyright scheme, the first step should be to determine whether the subject matter in question constitutes a computer program, database or any other subject matter. In relation to other subject matter (and subsidiarily for the computer program and database as well), the InfoSoc Directive provides for a number of exclusive rights for authors in relation to their works.[7] This area of EU law remains applicable in the UK unless 'generally thought to be impeding the proper development of the law or to have led to results which were unjust or contrary to public policy'.[8]

2.1 Leges Speciales—Copyright in computer programs and databases

The first Directive harmonising copyright in relation to a specific subject matter was the Directive 91/250/EEC of 14 May 1991 on the legal protection of computer programs.[9] Perhaps surprisingly, the notion of computer program is not defined in the Computer Programs Directive. However, Recital 7 specifies that

> the term 'computer program' shall include programs in any form, including those which are incorporated into hardware. This term also includes preparatory design work leading to the development of a computer program provided that the nature of the preparatory work is such that a computer program can result from it at a later stage.[10]

This inclusive conception of computer program can be interpreted as to encompass results of all stages of the process of devising a computer program. The Explanatory Memorandum to the Computer Programs Directive offers a purpose-based definition of a computer

7 InfoSoc Directive, arts 2-4.

8 This was mentioned explicitly in relation to EU copyright by Sir Geoffrey Vos in *TuneIn Inc v Warner Music UK Ltd* [2021] EWCA Civ 441, [2021] EMLR 18 [201] referring to Lord Reid in *R v National Insurance Commissioner: ex parte Hudson* [1972] AC 944, 966**.**

9 Now the Directive 2009/24/EC of 23 April 2009 on the legal protection of computer programs [2009] OJ L 111/16 ('Computer Programs Directive').

10 Computer Programs Directive, recital 7.

program, as it defines it as 'a set of instructions the purpose of which is to cause an information processing device, a computer, to perform its functions.'[11]

The object of protection under the Computer Programs Directive is not, however, a computer program as such but rather 'the expression in any form of a computer program which permits reproduction in different computer languages, such as the source code and the object code'.[12] In *BSA*, the CJEU found that a graphic user interface is not an expression of a computer program because it only 'enables communication between the computer program and the user'[13] and it 'does not enable the reproduction of that computer program'.[14] In *SAS Institute*, the CJEU held that 'functionality of a computer program, the programming language and the format of data files [all of which are] used in a computer program in order to exploit certain of its functions'[15] do not constitute a form of expression of that program. In other words, functionality, programming language or data format are not deemed expressive elements of a computer program.

It follows that the purpose and function of the subject matter are decisive for its qualification as a computer program (and thus for applicability of the Computer Programs Directive) as well as determining the object of protection under the Computer Programs Directive. Following the *BSA* and *SAS Institute*, only those elements of a computer program that are executable (ie able to be run on a computer to allow its reproduction) are deemed expressive of ideas embedded in that computer program.

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11 Proposal for a Council Directive on the legal protection of computer programs COM(88) 816 final — SYN 183; 89/C 91/05) [1.1.]

12 Computer Programs Directive, art 1(2) and *BSA* para 35.

13 Case C-393/09 *Bezpečnostní softwarová asociace v Ministerstvo kultury* [2010] ECR I-13971, EU:C:2010:816, para 40.

14 ibid para 41.

15 Case C-406/10 *SAS Institute Inc v World Programming Ltd* [2012] EU:C:2012:259 para 39.

When it comes to copyright subsistence, the only criterion for protection is the originality of computer program. This means that a computer program must constitute 'the author's own intellectual creation [and n]o other criteria shall be applied to determine its eligibility for protection'.[16] Authorship is thus central for eligibility for protection.[17]

Again, the Explanatory Memorandum to the Computer Programs Directive can shed some light on the meaning of computer program and its originality as perceived by the drafters.

> As far as the property right is concerned, a computer program, in common with other works protected by intellectual property legislation, is the result of a creative intellectual human activity. [… T]he degree of creativity, skill and inventiveness required to devise a program make it no less deserving of protection than other works protected by copyright. The fact that computer programs have a utilitarian function does not change this.[18]

Hence, from the directive and the preparatory material follows that copyright in computer programs is available only for executable elements of those computer programs that are results of human creative intellectual activity involved in the process of their devising.

A subject matter may be protected by copyright in database under the Directive 96/9/EC of 11 March 1996 on the legal protection of databases if it amounts to a database in the sense of a collection of independent works, data or other materials arranged in a systematic or methodical way and individually accessible by electronic or other means.[19] As Professor von Lewinski writes, the terms systematic and methodological 'mean "according to a plan". Accordingly, the arrangement must be made according to fixed

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16 Computer Programs Directive, art 1(3).

17 Lionel Bently and Yin Harn Lee, 'Computer programs directive, art 2' in Bernt Hugenholtz and Thomas Dreier (eds), *Concise European Copyright Law* (2nd edn, Kluwer Law 2016) 248.

18 Proposal for a Council Directive on the legal protection of computer programs COM(88) 816 final — SYN 183; 89/C 91/05) [2.2.].

19 Directive 96/9/EC of 11 March 1996 on the legal protection of databases [1996] OJ L 77/20 ('Database Directive') art 1(2).

criteria.'[20] She also adds that these criteria should be given a broad interpretation in order to be compliant with the Berne Convention.[21]

The ultimate aim of the Database Directive is 'to stimulate the creation of data storage and processing systems in order to contribute to the development of an information market'.[22] This suggests that the purpose and function of enabling a systematic or methodical organisation of and access to information are definitional of a database. In *Football Dataco*, the CJEU confirmed that the selection and arrangement of the dates, times and names of teams in the form of a football fixture list qualified for a database in the sense of the directive.[23]

Databases in the above sense are protected by copyright if they 'by reason of the selection or arrangement of their contents, constitute the author's own intellectual creation [and n]o other criteria shall be applied to determine their eligibility'.[24] The CJEU further clarified that only the selection and arrangement of data by which the author of the database creates the structure of the database are relevant for copyright.[25] The requirement of originality is met if the author of a database 'expresses his creative ability in an original manner by making free and creative choices'[26] in the selection and arrangement of its contents (ie in the creation of the structure of the database).

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20 Silke von Lewinski, 'Database Directive' in Michel Walter and Silke von Lewinski (eds), *European Copyright Law. A Commentary* (OUP 2010) 695.

21 ibid 696.

22 Case C-604/10 *Football Dataco Ltd and Others v Yahoo! UK Ltd and Others* [2012] EU:C:2012:115, para 34. Case C-203/02 *The British Horseracing Board* [2004] EU:C:2004:695 para 30.

23 *Football Dataco* (n 22) para 26.

24 Database Directive, art 3(1), Computer Programs Directive, art 1(3).

25 *Football Dataco* (n 22) para 32.

26 ibid para 38.

Then, for a change, the CJEU muddied the waters by saying that a database is not original if 'setting up of the database is dictated by technical considerations, rules and constraints which leave no room for creative freedom'.[27] It follows that an original database must, on one hand, be arranged in a systematic or methodological way which implies some observable regularity and a pattern given by an underlying, internal rule to qualify for a database under the Database Directive and whose creation, on the other hand, must not be completely constrained by technical considerations, rules or constraints.

A plausible reading of these accounts in conjunction (going beyond what the CJEU suggests) could be that the only rules determining the structure of the database that are eligible for copyright are those which are internal and individual to each author and not necessary to achieve a technical result. Similarly to the case of computer programs, authorship is key to establish eligibility.

Regardless of the above, according to Recital 15 of the Database Directive originality is to stem from selection or the arrangement of the contents of the database and that the object of protection is the structure of the database. It follows from the directive and the case law that copyright in database is available only for structural elements of those databases that are author's own intellectual creation or, put differently, results of author's own arrangement and selection of the contents of the database.

2.2 Lex Generalis—InfoSoc Directive

The Directive 92/100/EEC of 19 November 1992 on rental right and lending right and on certain rights related to copyright in the field of intellectual property[28] defined another

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27 ibid para 39.

28 Now Directive 2006/115/EC of 12 December 2006 on rental right and lending right and on certain rights related to copyright in the field of intellectual property (codified version) [2006] OJ L 376/28 ('Rental and Lending Directive').

copyright eligible subject matter—a film—as 'a cinematographic or audiovisual work or moving images, whether or not accompanied by sound'.[29] In contrast to computer programs and databases, the definition of a film presents a content-based rather than a purpose-based definition. This discrepancy may signal that the EU legislator does not have any overarching policy as to the way in which copyright eligible subject matter should be defined. Though a film has its own special definition in the Rental and Lending Directive, copyright in film falls under the general regime of the InfoSoc Directive.

Absent EU-level definitions of any other specific subject matter such as a literary or musical work, a subject matter may be protected by copyright plainly as a work under Articles 2, 3 and 4 of the InfoSoc Directive.[30] In *Infopaq*, the CJEU ruled that an extract of 11 words can be protected by copyright if it is 'the expression of the intellectual creation of their author'.[31] According to the CJEU, newspaper articles (of which the extracts in question formed parts) were clearly literary works as one could tell from their 'form, the manner in which the subject is presented and the linguistic expression'.[32] The CJEU added that '[i]t is only through the choice, sequence and combination of those words that the author may express his creativity in an original manner and achieve a result which is an intellectual creation.'[33]

For putting the emphasis on sequence and arrangements of words, the CJEU was criticized to 'conceiv[e] original works in purely formalistic terms, as compilations of

29 Rental and Lending Directive, art 2 (1)(c).

30 InfoSoc Directive (n 6).

31 *Infopaq* (n 2) para 51.

32 ibid para 44.

33 ibid para 45.

words, sounds, images and human movements.'[34] In contrast, the present thesis advances a reading the case under which 'the choice, sequence and combination' of building blocks (or constitutive elements) merely indicates where to look for originality without suggesting that such compilations are, as they stand, (original) works.

In a consequent judgment, the CJEU found that although a graphic user interface cannot be protected by copyright in computer programs, it can still fall under the copyright regime of the InfoSoc Directive, provided it 'is original in the sense that it is its author's own intellectual creation'.[35] Whether a graphic user interface or an extract of 11 words are, in fact, author's own intellectual creation is to be assessed by a national court.

In addition to the above, scholarship lists also other legal conditions for a copyright eligible subject matter.[36] First, in *Levola*, the CJEU found that the subject matter must be capable of being identified with sufficient precision and objectivity.[37] This was reiterated in *Pelham* where the CJEU opined that a copyright subject matter may be 'very short' but still must be long and distinct enough to be perceivable and recognisable by human senses.[38]

Second, while individual words can be perceived, they cannot be protected by copyright.[39] The minimal size of a subject matter to qualify for a literary work must be such that allows to 'convey[…] to the reader the originality of a publication such as a newspaper

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34 Justine Pila, 'The authorial works protectable by copyright' in Eleonora Rosati (ed), *The Routledge Handbook of EU Copyright Law* (Routledge 2021).

35 *BSA* (n 13) para 37, reiterated in para 45.

36 These will not be discussed here at any length because they do not reflect the human aspects of creation. But a comprehensive account can be found in Pila (n 34).

37 Case C-310/17 *Levola Hengelo BV v Smilde Foods BV* [2018] EU:C:2018:899, para 40.

38 Case C-476/17 *Pelham GmbH and Others v Ralf Hütter and Florian Schneider-Esleben* [2019] EU:C:2019:624, para 39.

39 *Infopaq* (n 2) para 46.

article, by communicating to that reader an element which is, in itself, the expression of the intellectual creation of the author of that article.'[40]

This implies that a literary work is not limited to what is traditionally perceived as a self-contained article or a novel. As Professor Sherman points out, '[b]y suggesting that an element of a work may be protected if it contributes to the originality of the whole, the decision potentially shifts the focus away from a taxonomic inquiry into when a part of a work might be treated as a separate work in its own right'[41] This chapter agrees that the *Infopaq* decision meant a shift of attention from the eligible subject matter in terms of the classic categories. It also observes that it might have also signified a shift of attention onto originality which trend the CJEU follows since then (see 0 Originality in EU Copyright).

2.3 Synthesis

As follows from the CJEU's case law, there is a two-track copyright regime at the EU level. One track is special for computer programs and databases and the other one is for the rest of the works. The problem for works in the latter track is that these works are not defined above and beyond being author's own intellectual creations. While in the former track, it is possible to speak of non-original computer programs and original computer programs, the latter track allows recognition only of works or non-works.[42]

Another difference between the subject matter in the two tracks is that computer programs and databases are defined through the purpose and function, whereas EU

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40 ibid para 47.

41 Brad Sherman, 'What is a Copyright Work?' (2011) 12 Theoretical Inq L 99, 118. In the cited part Professor Sherman analysed the EU approach to the concept of work.

42 Photographs seem to be a hybrid in the eyes of these two tracks. On the one hand, they do not enjoy a special copyright regime like computer programs and databases and straightforwardly fall within the general regime of the InfoSoc Directive. On the other hand, recital 16 of the Directive 2006/116/EC of 12 December 2006 on the term of protection of copyright and certain related rights [2006] OJ L 372/12

copyright law remains silent on the purpose and function of other types of subject matter. Also, categorisation of subject matter seems necessary for determining its expressive elements, ie those parts of work that must be proven author's own should authorship be claimed successfully.[43] This means that the Member States are free to ascertain their constitutive and expressive elements according to their laws and their authors together with relevant authorial contributions. In consequence, this not only impedes the harmonisation effects but also exposes that the definition of work at the EU level is not complete and self-standing.

Further, after *Infopaq* and *BSA*, the CJEU might have given the impression that in relation to a subject matter not defined specifically by the EU copyright directives, it opts for one and only copyright subsistence criterion: an author's own intellectual creation. For instance, Torremans asks whether the criterion of author's own intellectual creation became 'the sole criterion to define the autonomous concept of "a work"'.[44]

In efforts to justify the place of 'intellectual creation' in EU copyright law, the CJEU relies on international copyright instruments. In *Infopaq*, it states that '[i]t is, moreover, apparent from the general scheme of the Berne Convention, in particular Article 2(5)[45] and

('Term Directive') speaks of copyright protection of original photographs and other means of protection for other photographs, probably meaning non-original photographs.

43 Building on Justine Pila, 'An Intentional View of the Copyright Work' (2008) 4 MLR 535.

44 Paul Torremans, 'The role of the CJEU's autonomous concepts as a harmonising element of copyright law in the United Kingdom' (2019) 4 IPQ 265, 272.

45 Berne Convention for the Protection of Literary and Artistic Works (Paris Act of 24 July 1971), as amended on 28 September 1979 ('Berne Convention') art 2(5): 'Collections of literary or artistic works such as encyclopaedias and anthologies which, by reason of the selection and arrangement of their contents, constitute intellectual creations shall be protected as such, without prejudice to the copyright in each of the works forming part of such collections.'

(8),[46] that the protection of certain subject-matters as artistic or literary works presupposes that they are intellectual creations'[47] (footnotes added).

On top of what can be found in the scholarly literature, here it is recognised that there are two plausible ways in which 'presupposes' from *Infopaq* can be understood. 'Presuppose' may mean to presume,[48] or require as a necessary condition.[49] If the CJEU used 'presuposes' in the former sense, it could mean that it is taken for granted that any artistic or literary work in its ordinary meaning (eg a book, dramatic piece, or musical compositions, etc)[50] is, as a matter of fact, an intellectual creation. This would mean that upon encountering a book, painting or musical composition, one automatically presumes that they have encountered an intellectual creation.

The interpretation of 'presupposes' as presumes also aligns with the conception of work proposed by Pila. She suggests that since the notion of 'work' is not defined in European copyright legislation, its meaning should follow its usual meaning in everyday language.[51] Hence, if a form of expression such as a song or a poem can be subsumed under the notion of a work in ordinary language, the law should just follow suit.

This perception of work also corresponds to the pre-modern understanding of protected subject matter in common law. Pre-modern copyright was fragmented, subject-

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46 ibid art 2(8): 'The protection of this Convention shall not apply to news of the day or to miscellaneous facts having the character of mere items of press information.'

47 See *Infopaq* (n 2) para 34.

48 The term 'presuppose' means to assume, suppose, or postulate beforehand; to take for granted; to presume; to think or believe (something) in advance of actual knowledge or experience. Oxford English Dictionary Online (*EOD*, December 2020) <https://www.oed.com/> accessed 31 December 2021.

49 The terms 'presuppose' means to require as a necessary preceding condition; to imply or require as something previously or already present or in existence according to the Oxford English Dictionary ibid.

50 Berne Convention (n 45) art 2(1) provides examples of literary and artistic works.

51 Pila (n 34) with reference to Case C-201/13 *Johan Deckmyn and Vrijheidsfonds VZW v Helena Vandersteen* [2014] EU:C:2014:2132 para 19.

specific and the protected subject matter was perceived as still tied with the tangible object.[52] This was the case until the subject matter became conceived through its belonging to more abstract categories (the work as a species)[53] in modern copyright.[54]

Alternatively, if the CJEU wanted to give 'presuposes' the conditional meaning, then a subject matter would be required to be an intellectual creation as a pre-condition for being a literary or artistic work in the sense of the Berne Convention.[55] In my view, the CJEU itself leans to the latter, ie the conditional, meaning given the immediate context of the word 'presupposes' as it follows from the context in which it was mentioned.

> It is, moreover, apparent from the general scheme of the Berne Convention, […] that the protection of certain subject-matters as artistic or literary works presupposes that they are intellectual creations. Similarly, […] works such as computer programs, databases or photographs are protected by copyright only if they are original in the sense that they are their author's own intellectual creation. […] In those circumstances, copyright […] is liable to apply only in relation to a subject-matter which is original in the sense that it is its author's own intellectual creation.[56]

Here it is argued that the CJEU had intended to use 'presupposes' in the conditional meaning if it wanted to achieve its own aim of being in line with the Berne Convention.[57]

Interpreting 'presupposes' as 'requires as a necessary condition' has further significant implications. It permits to argue that a subject matter must be primarily an intellectual creation and only by virtue of being an intellectual creation, constitutes a

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52 Brad Sherman and Lionel Bently, *The Making of Modern Intellectual Property Law: The British Experience, 1760-1911* (CUP 1999) 17-18.

53 Sherman (n 41) 120.

54 Sherman and Bently (n 52), 17-18.

55 See *Infopaq* (n 2), para 34 and *Cofemel* (n 3) para 24.

56 *Infopaq* (n 2) para 34-37.

57 There are some plausible objections to the approach of the CJEU to the Berne Convention. According to Professor Derclaye, the CJEU does not use the Berne Convention appropriately because the Berne Convention's minimum standards are not binding in relation to state's own nationals, e.g. for the EU in relation to EU citizens. Estelle Derclaye, 'The Court of Justice copyright case law: quo vadis?' (2014) 11 EIPR 716, 721. In a less critical view adopted by Professor Vousden, 'the relationship between the Berne Convention and EU law is not one of a slavish adherence'. Stephen Vousden, 'Infopaq and the Europeanisation of copyright law' (2010) 2 WIPO J 197.

literary, scientific and artistic work in the sense of the Berne Convention. This implies that only those books, paintings or musical compositions that are intellectual creations constitute literary, scientific or artistic works in the sense of the Berne Convention as well as that not all books, paintings or musical compositions are necessarily literary, scientific or artistic works in the sense of the Berne Convention.

While the *leges speciales* directives (discussed above in 0 *Leges speciales: Copyright in computer programs and databases*) and their preparatory materials indicate that certain purpose and function are definitional of computer programs and databases, the CJEU did not follow this pattern and did not interpret the generally eligible subject matter —the work—as requiring a distinguishing purpose or function.

Therefore, it is difficult to synthesize more than the following: rights under the InfoSoc Directive protect only expressive elements of those literary or artistic works that are author's own intellectual creation.[58] Abstracting from *Infopaq*, a work comes into existence[59] when its author choses, sequences and combines the constitutive elements in an original manner. This relatively vague conclusion on copyrightability of a subject matter can be further refined by clarifying what 'author's own intellectual creation' and 'original manner' entail according to the CJEU.

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58 For instance, Witten Group proposed the following definition of a work: 'any expression within the field of literature, art or science insofar as it constitutes its author's own intellectual creation.' The Wittem Group, 'European Copyright Code' (2011) 2 EIPR, 76. Though both definitions are semantically close, this thesis did not adopt the definition of the Wittem Group because it will make use of 'expressive elements' (and thus a more granular approach) in the analysis that follows. Additionally, the Wittem Group explains in footnote 7 that '"expression" indicates the traditional requirement that works be the result of the author's personal expression'. This suggests that expression can be used interchangeably with creation, whereas this thesis regards the expression or expressive elements as distinct from the creation. Similarly, the CJEU makes a distinction between creation and expression in *Infopaq* para 51: 'if the elements thus reproduced are the expression of the intellectual creation of their author'.

59 In a more general manner, this is stated in Recital 19 of the Directive 2004/48/EC of 29 April 2004 on the enforcement of intellectual property rights [2004] OJ L 195/16 'copyright exists from the creation of a work and does not require formal registration […].'

3 ORIGINALITY IN EU COPYRIGHT

In EU copyright scholarship, the criterion of author's own intellectual creation is regularly associated with originality.[60] While there exists extensive scholarship evaluating the moves of the CJEU with respect to harmonisation (or creation) of the originality standard and the interplay between national the EU and national standards, not much of space is devoted to the definitional elements of the EU standard. In addition, scholarly literature tends to refer to the free and creative choices together[61] and the personal nature of the choices is not traditionally perceived as possibly self-standing.

This chapter contributes to the literature by splitting the idiom of free and creative choices and conceiving of free choices, creative choices and personal choices as separate choices (which, in real life, may or may not be cumulated). This allows to allocate the human aspects in the choices and thus give the analysis of the EU copyright criteria a new flavour.

To reiterate, copyright in computer programs and databases is conditioned upon them being their author's own intellectual creations. Under the Term Directive, photographs are protected by copyright provided they are the 'author's own intellectual creations reflecting

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60 '[T]he Court of Justice concluded that there was a generalized standard of originality – namely, "author's own intellectual creation".' Lionel Bently and others, *Intellectual Property Law* (5th edn, OUP 2018) 98. 'These works will be protected where they are original in the sense that they are the "author's own intellectual creation". This new EU standard of originality […]' Tanya Aplin and Jennifer Davis, *Intellectual Property Law: Text, Cases, and Materials* (3rd edn, OUP 2017) 120. Eleonora Rosati, *Originality in EU copyright: full harmonization through case law* (Edward Elgar 2013) 109.

61 '[I]t is clear that decisions that are limited by functional constraints or "rules" are not to be regarded as "creative choices".' Bently and others (n 60) 101. Aplin and Davis (n 60) 126. Annette Kur, 'Unité de l'art is here to stay – Cofemel and its consequences' (2020) 4 JIPIL 290. Professors Loewenheim and Leistner refer to free and creative choices as 'frei kreativer Entscheidungen' (without comma between free and creative; two times) as well as 'Gestaltungsspielraum für freie, kreative Entscheidungen' (with comma; two times) in Ulrich Loewenheim, Matthias Leistner, § 6 Schutzvoraussetzungen, in Ulrich Loewenheim and Matthias Leistner (eds), *Handbuch des Urheberrechts* (3rd edn, CH Beck 2021) [5]-[10]. Though putting comma would normally change the meaning, here it seems that it did not matter and 'free and creative choices' are treated somehow similarly to skill, labour and judgment standard. These words usually appear together, sometime with and or with or between labour and judgment and thus are taken as an idiom with a single meaning regardless of the variation.

his personality, no other criteria such as merit or purpose being taken into account'.[62] As shown below, the CJEU often refers to author's own intellectual creation as to making free and creative choices. Therefore, this analysis proceeds along the axes of: (i) free choices, (ii) creative choices and (iii) author's own (personal) choices.

3.1 Free Choices

First, in the CJEU's jurisprudence, the making of free choices is conditioned upon such circumstances that provide sufficient 'freedom of creative choice'[63] to the author to create their work. The CJEU has flagged some subject matter as not offering any or sufficient creative freedom to make free choices. For instance, there are subject matter that are not eligible for protection because they are the building blocks of intellectual creations, such as words,[64] and as such they do not provide sufficient freedom of creative choice.

Further, in *Brompton Bicycle*, the CJEU found that the possibility of making free, creative choices is limited to the extent to which the subject matter is determined by technical considerations or rules.[65] In *BSA*, the CJEU reiterated that copyright protection is excluded if the expressive elements of a subject matter are determined by circumstances external to its author: 'where the expression of those components is dictated by their technical function, the criterion of originality is not met, since the different methods of implementing an idea are so limited that the idea and the expression become indissociable'.[66] For instance, sporting events do not constitute intellectual creations that

62 Now Term Directive, art 6 and recital 16.

63 Bernt Hugenholtz, 'Works of literature, science and art' in Bernt Hugenholtz and others (eds), *A century of Dutch copyright law* (deLex 2012) 54.

64 *Infopaq* (n 2) para 45.

65 Case C-833/18 *SI and Brompton Bicycle Ltd v Chedech / Get2Get* [2020] EU:C:2020:461, para 24.

66 *BSA* (n 13) para 49.

are works and this should apply 'in particular to football matches, which are subject to rules of the game, leaving no room for creative freedom for the purposes of copyright'.[67]

From *FAPL, BSA* and *Brompton Bicycle*, it follows that there are constraints, external to every aspirant author, such as rules of a game, or constraints of a technical nature, that prevent the making of free choices. In contrast, the creative freedom of an author of a literary work does not seem to be constrained by the rules of grammar, spelling and syntax in the same way.[68]

The current case law yields only a negative definition of creative freedom: free choices are possible where the subject matter is not entirely dictated by certain kinds of rules, utility or technical function. As authors can only react to the possibilities offered to them by the freedom of choice, it is not the authors who determine which choices are free to be exploited for copyright purposes. Regrettably, the CJEU does not define the creative freedom in positive terms.

3.2 Creative Choices

In this thesis, 'creative choices' are understood differently than by other scholars. Goold, for instance, understands creative choices as 'creative in the sense that they were aesthetic judgments unconstrained by utilitarian or functional concerns'.[69] But this understanding

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67 Joined cases C-403/08 and C-429/08 *Football Association Premier League Ltd and Others v QC Leisure and Others,* and *Karen Murphy v Media Protection Services* EU:C:2011:631, [2011] ECR I-9083, [2012] 1 CLRM (29) 769 ECJ, para 98.

68 A similar critical observation can be found with respect to *FAPL* in Justine Pila and Paul Torremans, *European Intellectual Property Law* (2nd edn, OUP 2019) 263.

69 Patrick Goold, 'Artificial authors: case studies of copyright in works of machine learning' (2020) 67 J Copyright Soc'y USA 427, 430.

does not sit neatly with the CJEU expressly excluding aesthetic considerations from the copyrightability assessment in *Cofemel*.[70]

Hugenholtz and Quintais regard creative choices as referring to the level of creativity which is required for copyright to subsist.[71] However, as they have observed themselves, the CJEU mentions creative choices and creativity without measuring them in degrees.[72] If the CJEU had indeed intended to conceptualise creativity as a standard (as some EU Members States before the harmonisation used to do) it would have done so through setting out a threshold to be passed.

There is, though, no sign of any such a qualitative threshold in the current EU copyright law. From this it can be inferred that the CJEU itself probably does not associate creative choices with choices of certain creative quality. Therefore, in contrast to the above conceptions of creativity and creative choices, in the present view, the CJEU's creative choices are better understood as such that lead to creation of the work.[73] In other words,

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70 *Cofemel* (n 3).

71 Bernt Hugenholtz and João Quintais, 'Copyright and Artificial Creation: Does EU Copyright Law Protect AI-Assisted Output?' (2021) 8 IIC 1190, 2021.

72 ibid.

73 This is plausible to argue also in the light of other language versions of 'creative' choices. For instance, the German version uses the synonyms 'kreativ' and 'schöpferisch' interchangeably and the French one goes by 'créatif' in all cases.

Compare the language versions of *Cofemel* (n 3) para 30: '[…] it follows from the Court's settled case-law that, if a subject matter is to be capable of being regarded as original, it is both necessary and sufficient that the subject matter reflects the personality of its author, as an expression of his free and creative choices […]'. / '[…] nach ständiger Rechtsprechung des Gerichtshofs ein Gegenstand erst bzw. bereits dann als Original angesehen werden, wenn er die Persönlichkeit seines Urhebers widerspiegelt, indem er dessen freie kreative Entscheidungen zum Ausdruck bringt […]'. / '[…] il découle de la jurisprudence constante de la Cour que, pour qu'un objet puisse être regardé comme original, il est à la fois nécessaire et suffisant que celui-ci reflète la personnalité de son auteur, en manifestant les choix libres et créatifs de ce dernier […]'.

Compare also *Cofemel* (n 3) para 54: 'Second, it is admittedly the case that aesthetic considerations play a part in creative activity.' / 'Zum anderen trifft es zwar zu, dass ästhetische Erwägungen Teil der schöpferischen Tätigkeit sind.' / 'D'autre part, il est certes vrai que des considérations d'ordre esthétique participent de l'activité creative.'

they are building or constitutive choices. Further below, the CJEU's case law is analysed through this prism.

In relation to a literary work, the CJEU clarified that what matters for determining the author's own intellectual creation is realising 'the choice, sequence and combination of those words'[74] (ie the constitutive elements or the building blocks of a literary work) through which 'the author may express his creativity [read creativity as his ability to make a subject matter come into being[75]] in an original manner and achieve a result which is an intellectual creation'.[76]

In *Funke Medien*, in relation to military reports, the CJEU was more specific when it found that

> […] it is for the national court to ascertain whether, in drawing up those reports, the author was able to make free and creative choices capable of conveying to the reader the originality of the subject matter at issue, the originality of which arises from the choice, sequence and combination of the words by which the author expressed his or her creativity in an original manner and achieved a result which is an intellectual creation […], whereas the mere intellectual effort and skill of creating those reports are not relevant in that'.[77]

In this judgment, the CJEU clearly distinguished the activity of choosing, sequencing and combining in the process of drawing up the reports as the only activity relevant for copyright in the reports. It contrasted it with the intellectual activity invested in creating the content of the reports. Therefore, the copyright-relevant building choices were only those concerning the formulation, expression and presentation of the facts contained in the reports.

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74 *Infopaq* (n 219) para 45.

75 Or 'creative ability' as phrased in *Football Dataco* (n 22) para 38.

76 ibid.

77 Case C-469/17 *Funke Medien NRW GmbH v Bundesrepublik Deutschland* [2019] EU:C:2019:623, para 23.

In *Painer*, the CJEU stated that in principle, a portrait photograph can be an eligible subject matter because it allows a photographer to make 'free and creative choices in several ways and at various points in its production'.[78] A non-exhaustive list of choices available to a photographer was suggested by the CJEU.

> In the preparation phase, the photographer can choose the background, the subject's pose and the lighting. When taking a portrait photograph, he can choose the framing, the angle of view and the atmosphere created. Finally, when selecting the snapshot, the photographer may choose from a variety of developing techniques the one he wishes to adopt or, where appropriate, use computer software.[79]

In effect, the CJEU indicated what it regarded as the constitutive elements of a photographic work. However, this a level of detail into which it goes rarely.[80]

Similarly in *SAS Institute*, the CJEU found that the choice, sequence and combination of building blocks (vocabulary of a programming language) by which an expression in source code and object code is produced and which thus warrants protection, as opposed to the high-level choice of which programming language to use, what the computer program should do (ie its functionality) or data formats.[81]

In contrast to *Infopaq*, in which the CJEU talks about the choice, sequence and combination of words as building blocks of a literary work, in *Painer* the CJEU suggests that not only choices related to the building blocks of a photograph such as the colour of background, angle of view, etc. but also choices as to the techniques and software count as free and creative choices. While the choices as to the constitutive elements are immediately

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78 Case C-145/10 *Eva-Maria Painer v Standard VerlagsGmbH and Others* [2012] ECDR (6) 89, EU:C:2011:798, para 90.

79 ibid para 91.

80 Hugenholtz and Quintais refer to *Painer* in relation to AI-assisted outputs as well. They use it to model the creative process around three stages: conception, execution, redaction. According to them, choices in all these stages should be sufficient to find originality in AI-assisted outputs. So, in contrast to my suggestion, they do not seem to discriminate between choices as to the expressive elements and as to the means, including the use of an AI-driven system. Hugenholtz and Quintais (n 71).

81 *SAS Institute* (n 15) paras 39-41.

reflected in the final expression, the choices as to the software, possibly one running machine learning algorithms, are rather higher-level choices which are not in such an immediate proximity to the final expression.

Though the CJEU suggests this in *Infopaq*, *Funke Medien* and *SAS Institute* and not in *Painer*, it makes sense to treat only the choices as to the building blocks as free and creative choices. For instance, a photographer may choose to take pictures only on sunny days, and this will have an impact on the final expression. However, the choices as to angle of the shot and lighting under which they press the shutter button rather than the decision to take pictures on sunny days are immediately reflected in the expression. For this reason, only the former choices are the relevant building choices.

The same applies to copyright in databases. Just the choices as to the selection or arrangement of their contents which build the structure of the database are regarded as choices relevant for the assessment of originality.[82] Similarly, in *Funke Medien* the CJEU did not find the choices as to the creation of the content of the military reports relevant for assessing their copyright eligibility.[83] And this is so even though the content of the military reports necessarily had an impact on the final expression (assuming the expression communicated the content). Nonetheless, the choices as to the report content were arguably not as close to the final expression as the choice, sequence and combination of the words.

Hence, only choices pertaining to the expression and made directly and immediately in the process of work's creation, ie the creative choices, are relevant for the assessment of EU originality. Moreover, *Infopaq* as well as *Painer* imply that whether the choices are creative or not depends not only on the proximity of the choices to the expression but also on the type of subject matter. The choices as to the selection and arrangement of words are

82 Database Directive, art 3(1).

83 *Funke Medien* (n 77) 24.

irrelevant for creating a photograph and the selection and arrangement of lighting and angle of the shot is irrelevant for copyright in literary works. Identifying the right creative choices (and thus the relevant process of creation) will be easier in relation to traditional and well-established works such as novels or songs and less so in relation to non-conventional subject matter such as TV programme formats or sport moves.[84]

3.3 Author's Own Choices

The third limb of EU originality—the author's own or personal choices—refers to the author and their relationship to the work. As the CJEU held in *Painer*, the free and creative choices must be author's own in the sense that by making those choices, the author stamps 'the work created with his "personal touch"'.[85] The CJEU put the same in other words in *Cofemel*: the work must reflect 'the freedom of choice and personality of its author'.[86]

While scholarship primarily focused on expansion of the EU originality standard to works of applied art in *Cofemel*,[87] its impact on the EU originality standard itself seems to have been left uncommented. For the current purposes, the part of *Cofemel* in which the CJEU put the personal choices to the foreground is more interesting: 'if a subject matter is to be capable of being regarded as original, it is both necessary and sufficient that the subject matter reflects the personality of its author, as an expression of his free and creative choices'.[88] In other words, the CJEU states that the necessary and sufficient condition for

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84 For further examples see Enrico Bonadio and Nicola Lucchi, *Non-conventional copyright: do new and atypical works deserve protection?* (Edward Elgar Publishing 2018).

85 *Painer* (n 78) paras 89, 92.

86 *Cofemel* (n 3) para 54.

87 Annette Kur, 'Unité de l'art is here to stay – Cofemel and its consequnces' (2020) 4 JIPIL 290. Matthias Leistner, 'Einheitlicher europäischer Werkbegriff auch im Bereich der angewandten Kunst' [2009] GRUR 1114, Eleonora Rosati, 'CJEU rules that copyright protection for designs only requires only requires sufficient originality' (2019) 12 JIPIL 931.

88 *Cofemel* (n 3) para 30.

originality is the reflection of author's personality in the final expression. The view presented here is that this is a significant development because by giving the reflection of personality such a prominent place, the CJEU, too, heightened the status of the human aspects of creation embodied in the reflection of personality.

The problem with conditioning EU copyright on 'author's own intellectual creation' reflecting author's personality is that the EU copyright legislation does not define the general notion of 'author' and harmonisation in respect of authorship and ownership 'is minimal'.[89] Therefore, it is not certain who is the person whose personality should be reflected in the work and thus it is questionable whether the EU copyright subsistence criteria are actually harmonised sufficiently to produce the same effects in the Member States. (The national courts are often blamed for reluctance to submit themselves to the EU standard.[90] In the light of the above, rather the standard may be blamed because it is not complete enough to harmonise the laws anyhow.)

Some subject matter, however, have their authors defined in the EU copyright directives. The Computer Programs Directive puts it only succinctly that the author of a computer program is the natural person who created the program or the juridical person designated as the right holder if the national law so provides.[91] According to the Database

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89 Antoon Quaedvlieg, 'Authorship and Ownership: Authors, Entrepreneurs and Rights' in Tatiana-Helenē Synodinou (ed), *Codification of European copyright law: challenges and perspectives* (Wolters Kluwer Law & Business 2012) 230.

90 Aplin and Davis (n 60), Thomas Margoni, 'The Harmonisation of EU Copyright Law: The Originality Standard' in Mark Perry (ed), *Global Governance of Intellectual Property in the 21st Century: Reflecting Policy Through Change* (Springer 2016).

91 Computer Programs Directive, art 2(1).

Directive, the author of a database is the natural person who created it or the juridical person designated as the right holder by national legislation.[92]

Since these texts allow for the real creator as well as the first copyright holder to be both regarded as authors, this may lead to an absurd situation when applying the EU originality standard. If national legislation designates a juridical person as the first right holder in relation to a computer program, eg an employer, in relation to a computer program created by their employee, then this corporation is considered to be the author in the sense of the Computer Programs Directive and under EU copyright more broadly. Consequently, when a national judge comes to assessing copyright eligibility of that computer program, they should examine whether that author's personality is reflected in the computer program in order for it to constitute its author's own intellectual creation. If the employer is a juridical person this would require the courts to examine whether personality of that juridical person is reflected in the computer program.

Despite the uncertainty around authorship, Quaedvlieg reads into the EU copyright law a preference for the continental creator doctrine. As he puts it: '[w]hilst the software and database directives pretend to refrain from harmonising the allocation of authorship, they circumspectly transpire that a preference is felt for the creator'.[93] He adds that in the EU, contradictory to a more traditional perception of author-creator, the creator doctrine seems to be founded on 'economic considerations of fostering innovation'.[94]

Admittedly, even if the primary concern of the EU legislation in this area is innovation and creation of a digital single market, the EU copyright law is not that flat. For instance, its other objective is to safeguard 'the independence and dignity of artistic creators

92 Database Directive, art 4.

93 Quaedvlieg (n 89) 215.

94 ibid 231.

and performers'[95] which clearly indicates that copyright serves the persons who create and their personality attributes besides the market. As the above reveals, a further harmonisation and explicit policy statements in respect of authorship and ownership would be desirable.

The EU copyright law is slightly more specific about film authorship. In relation to a cinematographic or audiovisual work, its principal director shall be considered as its author or one of its authors.[96] The principal director also enjoys a special treatment in their capacity of author under EU copyright. In *Luksan*, the CJEU confirmed that a director of a film cannot be deprived of their authorship by the national legislation vesting authorship in other persons (so that the legislation excludes them).[97] The CJEU also held that the author under EU copyright, here the film director, cannot be deprived of the fair compensation provided for in Article 5(2)(b) of the InfoSoc Directive.[98]

Thus, the CJEU stepped in to protect not only the principal director's authorship as a status but also the fundamental economic rights flowing from authorship by making clear that rules vesting those rights in authors are *ius cogens*. Driven by a similar logic to the right to fair compensation under the InfoSoc Directive, the recitals of the Rental and Lending Directive emphasize that even if the economic rights are exploited by other persons, the authors and performers should receive an inalienable equitable remuneration for rental of their works and fixations of their performances.[99] *Luksan* as well as the above-mentioned legislation signal that authorship is taken seriously at the EU level.

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95 InfoSoc Directive, recital 11.

96 'Member States shall be free to designate other co-authors.' Term Directive, art 2(1). Rental and Lending Directive, art 2 (2) for the purposes of that directive.

97 Case C-277/10 *Martin Luksan v Petrus van der Let Luksan* [2012] EU:C:2012:65, Ruling 1.

98 ibid Ruling 3.

99 Rental and Lending Directive, recital 12.

Nonetheless, neither the Term Directive nor the Rental and Lending Directive explain why it is the principal director who merits the status of author. The Explanatory Memorandum to the Rental and Lending Directive states that 'at least the principal director of a cinematographic work shall be its author. [… I]t seems useful to take up the proposal of the European Parliament and to safeguard the legal protection for this important group of creative persons in all Member States'.[100]

Choosing the director from among all the persons making creative contributions to the film suggests that the EU legislators regard the activity of directing as so important to the creation of a film that it earns the director their status. Or, as put differently by Quaedvlieg, the principal director's activity is 'central to the creation of the "ensemble" of the film'.[101]

Given that the notion of film is defined only for the purposes of the Rental and Lending Directive,[102] for other purposes or EU copyright law in general it should be deemed undefined. However, reading the authorship provision of the Term Directive in conjunction with the case law on originality, it can be concluded that a film is its author's own intellectual creation if the free and creative choices in directing the creation of the film are made personally by its director so that the film reflects their personality. Despite the work of film not being defined, if at least the activity leading to its creation is articulated, the individual personal creative choices can be identified.

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100 Proposal for a Council Directive on Rental Right and Lending Right and on Certain Rights Related to Copyright in the Field of Intellectual Property of 30 April 1992, C0M(92) 159 final - SYN 319, 2 <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:51992PC0159&from=EN> accessed 31 December 2021.

101 Quaedvlieg (n 89) 228.

102 Rental and Lending Directive, art 2(1) c.

3.4 Synthesis

It follows there can be free choices that are not creative, eg the choice of words when creating a sculpture. There can also be creative choices that are not free, eg the choice of shapes and curves when designing a (rideable) bicycle. Equally, personal choices in the sense of one's own choices that are neither free nor creative for copyright purposes are conceivable, eg the ensemble of choices of moves when (seriously) playing football. However, can there be personal choices which make the author's personality reflected in the final expression that are not free and creative?

In the search for human aspects of creation in the EU originality standard, the creative freedom for copyright purposes emerges from the CJEU's case law as a vague and unreliable category. The CJEU decides which subject matter does not provide room for creative freedom merely on an ad hoc basis without formulating a common underlying principle. The other aspect which, however, flows clearly from the case law is that the creative freedom is rather external to the author and the author is only responsive to what is (ad hoc) allowed. If one plays football, no matter how much they aspire to 'create' or 'own' the game, copyright will not subsist in the game. Therefore, for the purpose of detecting reflections of human authorship in the EU copyright subsistence criteria, the creative freedom can be excluded. Hence, the human authorship aspects seem to be reflected only in the requirement for the personal nature of the creative choices made in the process of creation.

Since a work in the sense of the Berne Convention and *Infopaq* is predicated on its being an author's own intellectual creation, this gives the impression that the free, creative and personal choices (corresponding to the author's own intellectual creation in the CJEU's idiom) are all equal and regarded as the necessary aspects of a subject matter to constitute a work in the sense of the Berne Convention and *Infopaq.*

Despite these expectations, in *Cofemel*, as it is argued here, the CJEU has elevated the 'own' choices and the reflection of author's personality to the status of not only a necessary but also a sufficient condition for a subject matter to constitute an original work.[103] In this respect, it is argued that *Cofemel* may be as ground-breaking as *Infopaq*. As *Infopaq* meant a shift of the focus from encapsulation of the subject matter in the traditional categories, *Cofemel* may mean a shift of the focus from free and creative choices to the sole (substantive) criterion of the reflection of personality.

To make a short socio-legal detour, it is noteworthy that in those CJEU's judgments that put most emphasis on reflection of personality and thus human aspects of the copyright subsistence criteria, ie *Infopaq*, *Painer* and *Cofemel*, the judge Rapporteur was Professor Malenovský, a professor of international public law at the Masaryk University in Brno with close connection to France (which will appear even more telling in the light of the next chapter).[104]

4 APPLICATION OF THE EU COPYRIGHT SUBSISTENCE CRITERIA TO HUMAN-AI PRODUCTIONS

Given the close resemblance of human-AI productions that possibly lack human authors and authored works, one may wonder whether there could be a subject matter that would fall within the literary, scientific and artistic domain and, at the same time, that would not constitute an intellectual creation.

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103 '[I]f a subject matter is to be capable of being regarded as original, it is both necessary and sufficient that the subject matter reflects the personality of its author, as an expression of his free and creative choices'. *Cofemel* (n 3) para 30, discussed more above.

104 CV of the judge on the pages of the Czech Constitutional Court, 'Emeritní funkcionáři a soudci Prof. JUDr. Jiří Malenovský, CSc.' (*usoud* 2015) <https://www.usoud.cz/emeritni-funkcionari-a-soudci?tx_odjudges%5Bdetail%5D=18&cHash=575a0e8402d2e6bbdd63027c0325b843> accessed 25 October 2021.

If the author's own intellectual creation is a pre-condition for any literary or artistic work then only those literary and artistic works that are, in effect, intellectual creations constitute works in the sense of the InfoSoc Directive. Thus, any inquiry into copyright subsistence of a subject matter should start with the question whether it meets the requirement of author's own intellectual creation.

Additionally, to filter out expressive human-AI productions without a human author, the EU originality standard should be interpreted so that it puts even more emphasis on its human aspects, ie the personal nature of the creative choices made in the process of creation. The reason is that although an AI-driven system may make free choices and creative choices, it will not be able to make personal choices or choices reflecting personality as it does not have any personality.[105]

There is a solid basis in the CJEU case law to claim that the 'reflection of personality'[106] and 'author's own choices' should play the leading role (as 'both necessary and sufficient'[107] condition) in determining whether a subject matter qualifies for copyright subsistence. This would mean that the free and creative choices must be made by the author personally and cannot be delegated to any other agent.

The epistemic difficulty that presents itself is how to find and identify the author's personality in the work. In *Cofemel*, the CJEU seems to invite the national court to look for a reflection or manifestation of the author's personality and author's own choices in the subject matter, ie in the final design.[108] In *Brompton Bicycle*, however, the CJEU points to

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105 Professor Floridi calls the painting from the Next Rembrandt project an ectype: 'ectypes can be authentic but unoriginal artefacts' because there is some link to the source, but the subject matter does not originate from that source. Luciano Floridi, 'Artificial Intelligence, Deepfakes and a Future of Ectypes' (2018) 31 Philos & Technol 317, 319.

106 This seems to be the case in particular on the basis of *Cofemel* (n 3) para 30 and *Brompton Bicycle* (n 65) para 23.

107 *Cofemel* (n 3).

108 ibid para 54.

the process of creation as it gives instructions to the national courts to 'account of all the relevant aspects of the present case, as they existed when that subject matter was designed, irrespective of the factors external to and subsequent to the creation of the product'.[109] This should include factors that help 'to reveal what was taken into consideration in [the process of] choosing the shape of the product concerned'.[110]

Given the specific facts of this case, the CJEU seems to have suggested that if certain features of the subject matter, such as its particular shape, were, at some point of time, claimed as technical, possibly even inventive, for the purposes of patent protection, then they can hardly be re-qualified ex post the creation and claimed as personal creative choices for the purposes of copyright protection.

It follows that the process of creation should be put into the spotlight and, in my reading *Brompton Bicycle* is the first step in this direction.[111] This is important for determining which AIGOs qualify for protection because originality in the sense of author's (very) own choices can manifest itself more reliably in the process of creation of the work than in the work itself. The fact that a process of creation can reveal more information about the origin of the work than the work itself is illustrated by the following example from French copyright.

According to a doyen of French copyright law, Desbois, even if two painters paint the same scenery, each of the two paintings is original because both painters 'have, in effect, expended creative activity, one as the other, when engaging with the same subject independently from each other'.[112] Thereby, when the copyright subject matter is looked at

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109 *Brompton Bicycle* (n 65) para 37.

110 ibid para 36.

111 Though the CJEU did not acknowledge explicitly that such a shift in interpretation was intended.

112 Henri Desbois, *Le droit d´auteur en France* (3rd edn, Dalloz 1978) 5.

from the perspective of the underlying process, as in this example, the fact that each of these paintings owes its existence to an independent creative activity of each respective author and their own choices is retrievable, no matter the resemblance of the final results.

In contrast, one might be unable to tell whether the two paintings were authorial works (or possibly one a copy of another) merely from looking at them, without having the knowledge about their processes of creation. In the context human-AI productions, the proximity between relevant choices and the result (*Infopaq*) should be preferred as the guiding principle in contrast with recognising authorship on the basis of high-order relevant choices (*Painer*). The proximity or distance of choices from the result can be discerned from the process of creation only.

5 CONCLUSION

Despite the CJEU's harmonisation efforts, not much light was shed on the nature of the relationship between the author and their work.[113] This may be because the concept of author under the InfoSoc Directive is not defined. Neither are the protected expressive elements of works defined in positive terms. To be more precise, in EU copyright law they seem to be perceived as broadly as elements falling into literary or artistic domain. The missing definition of author and specification of expressive elements of categories of work makes the pinning down of the concept of human authorship at the EU level challenging.

In general, it could be said that copyright subsists in the expressive elements of those works whose building blocks were chosen, sequenced and combined (*Infopaq*) so that they

[113] Another question is whether the CJEU should have undertaken such a diligent harmonisation of the concept of work in the first place. As pointed out by Vousden, the doctrine of autonomous concept comes from a domain of exclusive competence, whereas copyright is considered a domain of shared competence. Vousden (n 57). But this chapter does not dispute whether the CJEU should have harmonised, it merely works with the fact that the CJEU did so, and the subsequent case law does not suggest that it had done so inadvertently.

reflect personality of the individual who made the decisions as to the choice, sequence and combination. However, for this is quite abstract, it says little.

The nature of the relationship between the author and their work is somewhat clearer in case of subject matter defined in the EU directives, ie computer programs and databases. In relation to computer programs and databases, the protected expressive elements are specified in the directives. The directives also provide that the authors shall be primarily natural persons who created the computer programs and databases.

In relation to databases it can therefore be concluded that copyright subsists only in those structural elements (expressive elements) of those databases whose contents (building blocks) were arranged and selected so that they reflect personality of the individual who did the arrangement and selection of the contents. Copyright in computer programs is available only for executable elements of those computer programs that are results of human creative intellectual activity involved in the process of their devising.

A conclusion of a similar structure can be made for films because their authors are defined in the Term Directive. The identification of author of a film (being the principal director) allows to conclude that a person can claim authorship of a film if they prove that the free and creative choices in directing the making of the film were made personally by them so that the film reflects their personality.

In the light of the advancements in AI, the approach of the CJEU in *Cofemel* and *Brompton Bicycle* is commended for promoting the human aspects of creation and thus bringing the distinction between authored works and other subject matter closer to actualisation. This can be achieved through *Cofemel*'s emphasis on the reflection of personality as the supreme criterion and *Brompton Bicycle*'s directive to look for the personal creative choices in the process of creation.

In this chapter, the case law was read admittedly with the effort to make sense of it. Imputing *Cofemel* a reformist character, the EU copyright subsistence depends on:

i. a formal condition that a subject matter ought to be identifiable with sufficient precision and objectivity and
ii. a substantive condition that a subject matter ought to reflect its author's personality in the free and creative choices.

If the CJEU is going to maintain this approach in the future, the reflection of author's personality in the final expression will be treated as the ultimate indication of originality. Hence, once it is ascertained that the author's personality is reflected in a (precisely and objectively identifiable) subject matter, it follows without the need for any further proof that the creative choices must have been made and that the subject matter must have offered a sufficient creative freedom to enable the author to stamp their work with their personal touch.

CHAPTER VII.

AUTHORSHIP IN THE APPLICATION PRACTICE IN THE SELECTED JURISDICTIONS

1 INTRODUCTION

This chapter aims to examine whether the national copyright subsistence criteria in the UK, France and Germany which are, almost exclusively, centred around the object and its characteristics reflect human aspects of creation. This chapter shows that some human aspects can be traced and that they indeed are explicitly or implicitly present in the traditional (pre-harmonised) copyright subsistence criteria in the UK, France and Germany. At the national level, the chapter examines conceptions of work and the interplay between categories of work and originality as two key copyright subsistence criteria.

Further, the contribution of this chapter is to expose the discrepancy between the proclamations and theoretical accounts of the human aspects on the one hand and the practice of courts on the other. If the task of the national courts is to assess whether a subject matter in question amounts to an author's own intellectual creation, how would they proceed? In practice, the courts in the UK, France and Germany seem to be confident to conclude that an original work exists without seriously examining or verifying whether it embodies the required human authorship inputs.

Although a similar observation was made elsewhere, ie Stef van Gompel wrote that 'courts only consider whether subjective choices can be made, without actually examining

whether creative choices have been made by the author during the production of the work',[1] this was limited to the practice of courts in the Netherlands (ie a different jurisdiction from those examined here).

The research methodology in this chapter is underpinned by Professor Ohly's view that the methodology of europeanization 'should be principle-based, it should allow for "harmonisation by persuasiveness" or "borrowing from each other" and it should include a doctrine of precedent, for which carefully reasoned judgments are a necessary condition.'[2] While securing carefully reasoned judgments of the CJEU is beyond the powers of the present chapter, it at least attempts to follow the borrow and rule proposition. Therefore, this chapter also seeks to identify the common and shared human aspects on which the concept of human authorship at the EU level could be built in the future. This could also serve the practical purpose of enabling the distinction between an authorial (original) work and other subject matter in a harmonised manner throughout the EU (and the UK if convenient).

Lastly, this chapter reflects on how the copyright subsistence criteria, and especially the human aspects of the criteria, would apply to human-AI productions. Would the established courts' epistemic approaches or at least some parts of them have the potential to detect that the form of expression at hand is not an authored work? It concludes that even if the courts were able to distinguish the elements of work authored by human beings, some jurisdictions, eg the UK, may found themselves granting a disproportionately wide scope

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1 Stef van Gompel, 'Creativity, autonomy and personal touch. A critical appraisal of the CJEU's originality test for copyright' in Mireille van Eechoud (ed), *The Work of Authorship* (Amsterdam University Press 2014) 129.

2 Ansgar Ohly, 'Concluding Remarks: Postmodernism and Beyond' in Justine Pila and Ansgar Ohly (eds), *The Europeanization of Intellectual Property Law: Towards a European Legal Methodology* (OUP 2013) Abstract.

of protection in exchange for relatively minor authorial contributions. There seems to be no checks or balances to prevent this.

2 REFLECTIONS OF AUTHORSHIP AND THE PRACTICE OF COURTS IN THE UK

2.1 Copyright Eligible Subject Matter

In the UK, to qualify for an authorial work, a subject matter must, first, fall under one of the statutory categories of work, ie a literary, dramatic, musical, or artistic work ('LDMA') category.[3] These categories continue to be regarded as the starting point for claiming copyright in the UK[4] even though the finite nature of the categories is, arguably, contradictory to the CJEU's rulings in *BSA*, *Cofemel* and the Berne Convention. However, the significance of a correct categorisation of a work was stressed by the Court of Appeal relatively recently when it re-categorised a screenplay from a literary work to a dramatic work.[5]

A literary work is defined as any work 'other than a dramatic or musical work, which is written, spoken or sung, and accordingly includes a table or compilation, a computer program, preparatory design material for a computer program and a database'.[6] In *Exxon*,

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3 Copyright, Designs and Patents Act 1988 ('CDPA'), s 1(1)(a).

4 Lionel Bently and others, *Intellectual Property Law* (5th edn, OUP 2018) 61.

5 The Court of Appeal in *Kogan v Martin* [2019] EWCA Civ 1645, [2020] FSR 3 [66] quashed the conclusion of the first instance judge that a screenplay is a literary work. However, at the end of the day, this distinction did not carry much weight. The authorial contribution found on retrial, ie contribution of developing characters, musicality, choice of historical incident and musical terminology, would have virtually the same significance in a novel about an amateur opera singer as in a screenplay about the same.

6 CDPA, s 3(1).

Stephenson LJ defined literary work as 'something which was intended to afford either information and instruction, or pleasure in the form of literary enjoyment, whatever those last six words may add to the word "pleasure"'.[7]

However, in *NLA v Meltwater*,[8] the Court of Appeal found that headlines and article extracts of 256 characters can, in principle, and will in many instances (eg in the circumstances of the case at hand) contain 'elements which are the expression of the intellectual creation of the author of the article as a whole.'[9] Despite *Exxon* and *NLA v Meltwater* being similar in dealing with an extremely short arrangement of characters, the court in the latter case did not delve into discussing whether the extracts were literary works in sense of affording information or pleasure but rather relied on the Europeanised originality standard.

Dramatic works are defined as including 'a work of dance or mime'.[10] Additionally, the Court of Appeal held in *Norowzian*, that dramatic work 'should be given its ordinary and natural meaning, which was a work of action, with or without words or music, which was capable of being performed before an audience.'[11] For instance, if a film can be performed, including being played on a screen, before an audience, it falls within the definition of dramatic work.[12]

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7 *Exxon Corporation and Others v Exxon Insurance Consultants International Ltd* [1982] Ch 119, [1982] RPC 69 [88].

8 *Newspaper Licensing Agency Ltd and others v Meltwater Holding BV and others* [2011] EWCA Civ 890, [2012] Bus LR 53.

9 ibid [85].

10 ibid.

11 *Norowzian v Arks Ltd and Others (No 2)* [1999] EWCA Civ 3018, [2000] FSR 363, 363–64.

12 ibid.

Musical works are defined as works 'consisting of music, exclusive of any words or action intended to be sung, spoken or performed with the music'.[13] The Court of Appeal found in *Sawkins v Hyperion* that the meaning of a musical work is to be taken from ordinary language: 'as indicated in the dictionaries, the essence of music is combining sounds for listening to. Music is not the same as mere noise. The sound of music is intended to produce effects of some kind on the listener's emotions and intellect.'[14]

Artistic works are enumerated in the CDPA and encompass a graphic work, photograph, sculpture or collage, irrespective of artistic quality, a work of architecture being a building or a model for a building, or a work of artistic craftsmanship.[15] Each of these sub-categories then enjoys its own definition. For instance, a sculpture 'includes a cast or model made for purposes of sculpture'.[16] In *Lucasfilm*, an Imperial Stormtrooper helmet was found not to be a sculpture because it did not correspond to the meaning of the word which it has in ordinary language.[17] Neither was it qualified as a work of art because it 'was utilitarian in the sense that it was an element in the process of production of the film'.[18]

The LDMA categories do not seem to render any reflections of human aspects of creation. They rather stem from traditional understanding of the respective categories in ordinary language. Professor Pila emphasises the importance of intentionality to all the LDMA works. According to her, '[a]n LDMA is, and ought to be, an intentional expression

13 CDPA, s 3(1).

14 *Sawkins v Hyperion Records Ltd* [2005] EWCA Civ 565, [2005] 1 WLR 3281.

15 CDPA, s 4(1).

16 CDPA, s 4(2)(b).

17 *Lucasfilm Ltd v Ainsworth* [2011] UKSC 39, [2012] 1 AC 208 [44].

18 ibid.

of an LDMA idea; meaning an intentional expression of a particular idea associated with a tradition of LDMA authorship.'[19]

Under this prism, the LDMA categories could reflect human authorship in their intentionality aspect. Besides some of the definitions of LDMA works containing references to intentionality (ie literary work and musical work), it was the House of Lords in *Hensher v Restawile* which most eloquently relied on intentionality in relation to a sub-category of artistic works, ie works of artistic craftsmanship.[20] Their copyright subsistence depends on interpretation of the notion of 'artistic' and finding of whether the subject matter has an artistic character.[21] The artistic character should be assessed in an objective way while taking 'the intent of the creator and its result' as decisive and 'the conscious intention of the craftsman [as] the primary test'.[22]

2.2 Skill, Labour and Judgment

The traditional UK copyright case law does not refer to free and creative choices when it comes to the originality assessment of an authorial work. In more recent UK copyright cases, eg *Temple Island*, the EU copyright subsistence criteria were referred to with the result that the traditional skill, labour and judgment roughly correspond to the EU's author's own intellectual creation.[23] Moreover, the UK originality assessment entails considerations corresponding to those mentioned at the EU level, namely the considerations of the nature

19 Justine Pila, 'An Intentional View of the Copyright Work' (2008) 71 MLR 535, 557.

20 *George Hensher Ltd Appellants v Restawile Upholstery* [1976] AC 64 (HL).

21 CDPA, s 4(1)(c).

22 *George Hensher v Restawile* (n 20) 95 and 97.

23 'These elements above derive from and are the expression of the skill and labour exercised by Mr Fielder, or in Infopaq terms, they are his intellectual creation.' *Temple Island Collections Ltd v New English Teas Ltd* [2012] EWPCC 1, [2012] FSR 9 [53].

of the activity expended, ie the skill, labour and judgment, and whether this skill, labour and judgment were expended in the creation of the work.

The modern conception of originality in the UK copyright law can be traced back to Peterson J who defined the required originality as follows '[t]he originality which is required relates to the expression of the thought. But the Act does not require that the expression must be in an original or novel form, but that the work must not be copied from another work—that it should originate from the author.'[24] In *University of London Press,* setting mathematical papers required 'the exercise of brainwork, memory, and trained judgment, and even the selection of passages from other authors' works involved careful consideration, discretion, and choice'.[25]

More recent cases refer to the need to identify the required and relevant input of the author—'author's own substantial and independent effort, skill and time'[26] or, 'the expression of the skill and labour […] in *Infopaq* terms, […] intellectual creation'.[27] Put in other words, to meet the originality requirement, '[b]oth individual creative input and sweat of brow may be involved and will be factors in the overall evaluation'.[28]

In another case, a photograph was found original because

> [i]t is the result of [author's] own intellectual creation both in terms of his choices relating to the basic photograph itself: the precise motif, angle of shot, light and shade, illumination, and exposure and also in terms of his work after the photograph was taken to manipulate the image to satisfy his own visual aesthetic sense.[29]

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24 *University of London Press Ltd v University Tutorial Press Ltd* [1916] 2 Ch 601, 608–09.

25 ibid 604.

26 *Sawkins v Hyperion* (n 14) [16].

27 *Temple Island* (n 23) [53].

28 *Sawkins v Hyperion* (n 14) [83].

29 *Temple Island* (n 23) [51].

Moreover, the skill, labour and judgement must be invested in the right activity with regards to the work in question.[30] There is a general agreement that slavish copying, no matter how laborious, could not give rise to an original work.[31] While slavish copying is understood as performing 'an easy mechanical function',[32] a verbatim transcription of a speech given in public was deemed to be more than mere copying.[33]

In now superseded case law on data compilations, ie in *Ladbroke v Hill*,[34] the House of Lords did not distinguish between the skill, labour and judgement going into creation of a business idea and the skill, labour and judgement going into creation of the expression. More concretely, Lord Hodson appreciated about the betting coupons that 'the selection of headings showing the choice of bets offered by the plaintiffs is itself shown to have been the result of skill and labour expended on them.'[35] He further added that he 'cannot accept that preparatory work must be excluded in this case so as to draw a line between the effort involved in developing ideas and that minimal effort required in setting those ideas down on paper.'[36] The fact that the activity of creating data for a data compilation does not constitute the right creative activity for copyright purposes is now clear in the light of the CJEU's case law.[37]

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30 Hugh Laddie, Peter Prescott and Mary Vitoria, *The Modern Law of Copyright and Designs*, vol I (4th edn, LexisNexis 2011) 94.

31 *Sawkins v Hyperion* (n 26) [31] and [77].

32 ibid [82].

33 *Walter v Lane* [1900] AC 539 (HL) recognised as good law per Mummery LJ in *Sawkins v Hyperion* (n 26) [33].

34 *Ladbroke (Football) Ltd v William Hill (Football) Ltd* [1964] 1 WLR 273 (HL).

35 ibid 286.

36 ibid 287.

37 Case C-604/10 *Football Dataco Ltd and Others v Yahoo! UK Ltd and Others* [2012] EU:C:2012:115.

The *Ladbroke v Hill* decision pertinently demonstrates that the problem of the conception of the work is intertwined with the right activity and the process of creation. If the process of creation is framed as widely as including creation of raw data, abstract ideas and concepts then the relevant activity can encompass creating data, ideas and concepts.

Besides the exclusion of mechanical copying and coming up with ideas or (more recently) data as the relevant activity, the relevance of activity is relative to the type of work. In relation to a photograph, in *Temple Island*, the relevant skill, labour and judgement is the one poured into choosing the motif, angle of shot, light and shade, illumination, and exposure.[38]

In relation to a design drawing, in *Cala Homes*, the relevant intellectual input was 'the skill of making marks on paper or some other medium',[39] and 'the words or lines and the skill and effort involved in creating, selecting or gathering together the detailed concepts, data or emotions'[40] which were conveyed orally. In case of software, it was found that only the skill, labour and judgement invested in the actual programming is relevant for the originality assessment and not the 'skill, time and effort [expended] on testing the software'.[41]

In addition, the author's skill, labour, and judgement, taken as a whole, must be of a sufficient (qualitative and quantitative) degree[42] and hence of sufficient transformative character. 'The labour, skill and capital should be expended sufficiently to impart to the product some quality or character which the raw material did not possess, and which

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38 *Temple Island* (n 23) [51].

39 *Cala Homes (South) Limited v Alfred McAlpine Homes East Limited (No 1)* [1995] FSR 818 (Ch) 835.

40 ibid.

41 *Fylde Microsystems Ltd v Key Radio Systems Ltd* [1998] FSR 449 (Ch) 457.

42 *Sawkins* (n 26) [77]. '[O]riginality is a matter of degree depending on the amount of skill, judgment or labour that has been involved.' *Ladbroke* (n 34) 277–78. '[…] sufficient aural and musical significance to attract copyright protection.' *Sawkins* (n 26) [56].

differentiates the product from the raw material.'[43] Though a relatively modest one, the contribution may still count as sufficient, eg 'performing indications, tempo and performance practice indicators'[44] in case of musical work, if the contribution has 'sufficient aural and musical significance'.[45]

The cases of *Walter v Lane*[46] and *Cummins v Bond*[47] suggest that, except for the slavish copying, the requirement may be reduced to an execution of the relevant skill and any creative choices are automatically assumed to having been communicated in the execution. This (elderly,) simplified, and pragmatic version of originality notwithstanding, the UK law on originality, on the whole, reflects human authorship in natural person's own intellectual input that is of sufficient transformative character and poured into the activity typical for creation of that category of work.

2.3 Courts' Epistemic Approach to the Criteria

As a subject matter must fall within a statutory category of authorial work, this makes it possible to perceive the subject matter as a work within that category. Professor Pila formulates this as a necessity: 'in order to perceive a work *qua* work one must perceive it in relation to a category of work'.[48] This perception through the lens of a category is advantageous also in enabling determination of the expressive elements of the subject matter. When a subject matter finds itself outside the categories and outside their context, the UK courts struggle to determine the expressive elements and, consequently, originality.

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43 *Macmillan & Co Ltd v Cooper* (1924) 40 TLR 186 (PC) 188.

44 *Sawkins v Hyperion* (n 26) [56].

45 ibid.

46 *Walter v Lane* (n 33).

47 *Cummins v Bond* [1927] 1 Ch 167, 168.

48 Justine Pila, 'Copyright and Its Categories of Original Works' (2010) 30 OJLS 229, Abstract.

For instance, in *Merchandising Corp v Harpbond* a facial make up was denied copyright on the basis that it was found not to be a painting and thus an artistic work.[49] Similarly, in *Creation Records v News Group*, an arrangement of objects around members of a band containing a Rolls Royce in a swimming pool, a hotel, a scooter and other objects 'seemingly unrelated to each other'[50] was found unfitting into any of the categories. Examining the process of creation, Lloyd J found that

> I do not see how the process of assembling these disparate objects together with the members of the group can be regarded as having anything in common with sculpture or with artistic craftsmanship. No element in the composition has been carved, modelled or made in any of the other ways in which sculpture is made.[51]

Hence, the criterion of belonging to a category operates as the first, and for the less traditional works also the last, discriminator.

In sum, traditionally, and as recently confirmed in *Kogan v Martin*,[52] placing a subject matter into the right category (or, in effect, any category at all) is the first hurdle to overcome on the way to copyright subsistence. When conducting this categorisation, UK courts are guided by ordinary meanings of the statutory categories and falling outside the categories has its consequences.

Once a subject matter is put into an LDMA category, UK courts look at the human intellectual creative input (consideration, discretion and choice) poured into activity relevant for creation of that particular category of work coupled with the human transformative act (writing, drawing, correcting, punctuating, etc) causing the final creation—a work—to exist. Hence, in theory, the application of the requirement of originality should contain examination of the authorial contribution in the process of

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49 *Merchandising Corp v Harpbond* [1983] FSR 32 (CA).

50 *Creation Records Ltd and Others v News Group Newspapers Ltd* [1997] EMLR 444 (Ch) 447.

51 ibid 449.

52 *Kogan v Martin* (n 5).

creation of the work. The UK courts have experience with examining the process of creation, just in different contexts. They do so, for instance, in infringement proceedings if the defendant asserts independent creation, eg as in *Mitchell v BBC.*[53]

Unless and until the courts are prompted to examine the process, they primarily focus on the subject matter, ie the form of expression, rather than on the intellectual endeavours preceding the result (*Merchandising Corp v Harpbond, Lucasfilm, Exxon, Hensher Ltd Appellants v Restawile*). There are cases (*Ladbrook v Hill, Creation Records v News Group*) though in which courts focused on the process of creation and human inputs, however with results which do not sit neatly with the EU conception of work. Then there are also examples of the UK courts aligning with the CJEU (*Temple Island* with *Painer; SAS Institute v WPL* with the same at the EU level[54]) and, what is more, accommodating the EU language of 'intellectual creation'[55] and 'form of expression'.[56]

In contrast, in joint authorship cases or other cases where authorship was disputed (*Walter v Lane, Cummins v Bond, Sawkins v Hyperion, Cala Homes*), the evidence concerning the creative process is regarded as the most relevant. On the whole, in the absence of a challenge to authorship and thus opening of an inquiry into the process of creation, the courts are less likely to investigate that process on their own motion.

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53 *Michael Mitchell v British Broadcasting Corporation* [2011] EWPCC 42, [2011] 12 WLUK 734.

54 Case C-406/10 *SAS Institute Inc v World Programming Ltd* [2012] EU:C:2012:259.

55 *Temple Island* (n 26) [53].

56 *SAS Institute Inc v World Programming Ltd* [2013] EWHC 69 (Ch), [2013] RPC 17 [52].

2.4 Application of the UK Copyright Subsistence Criteria to Human-AI Productions

The aspect of 'intentionality'[57] significant for placing a subject matter into one of the LDMA categories has a potential to distinguish between an authored work and an authorless or partly authorless human-AI production. Yet, if the presence of intentionality and subject matter's belonging to a specific LDMA category is to be assessed objectively from the recipient's point of view and inferred from the expression of 'a particular idea associated with a tradition of LDMA authorship',[58] this carries the risk of focusing on the external and perceivable elements and their alignment with tradition instead of the presence of subjective (human) intentionality.

To make the distinction between human intellectual creations and other subject matter possible, the human aspects of originality, ie the skill, labour and judgment should gain more weight in the overall copyright subsistence assessment. In the UK, this can be achieved through adapting the UK copyright subsistence criteria to the EU interpretation of the concept of 'work' even after its departure from the EU. As the traditional UK approach does not rely on the notions of 'personality' or 'personal touch', in the light of the AI advancements, it would be desirable to put more emphasis on the personal character of the choices or personal character of the skill, labour and judgment so that the human aspects are more pronounced.

Another issue, gaining importance given the advancements in AI, is the proximity of choices to the final subject matter. If, hypothetically, a process of creation involves human designers and an AI-driven system whereas the latter is the last link in the chain of creation,

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57 Pila (n 19).

58 ibid 557.

the AI-driven system would be deemed the final arbiter in the sense of *Kogan v Martin* (ie who makes the final choice as to the form, for more details see Chapter IV.).

More specifically, even if human designers make choices that are relevant for creation of the form of expression and determine its expressive elements, whether these human designers' contributions actually determine the expressive elements may be dependent on the choices made by the AI-driven system. Under the current legal rules, the final arbiter position of one of collaborators ought not to preclude joint authorship between two persons.[59] Or, if analogy is applied, the sole authorship of a person in case of a human-AI production. This would be corroborated by *Cala Homes* as it recognises joint authorship in cases where a joint author's contribution 'finds its way into the finished work'.[60]

However, if an AI-driven system acts as the final arbiter making copyright relevant, ie creative, choices, then the question should be whether the chain of decisions made by human designers in the process is not severed by the AI-driven system's interference to the extent that the result would not reflect the personality of those human designers involved. Consequently, where no human designer is the intellectual, immediate and close (intimate) cause of a subject matter by virtue of their actions in the process of creation, then such subject matter does not merit copyright protection.

Alternatively to the above, if some of the choices made by the human designers find their way into the final subject matter, this would tip the human-AI production to having a human author and qualifying it for an authorial work. Even the objection made by the defendants in *Sawkins v Hyperion* that Mr Sawkins was not engaged 'in creation of a musical work at all'[61] would not be successful in the current hypothetical because the

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59 *Kogan v Martin* (n 5) [110].

60 *Cala Homes* (n 39) 834.

61 *Sawkins v Hyperion* (n 26) [42].

human designers making relevant and sufficiently concrete choices would be in the process of creation.

In such a scenario a problem arises as to whether the scope of protection is justified on the ground of human designers making high-order or non-final decisions about the expressive elements. Applying *Sawkins v Hyperion* by analogy, if the forms of expression were reproduced as a whole, infringement would likely be found, no matter the distance between the relevant human intellectual input and the result.

The extension of the scope of protection effectively over the whole work, including Lalande's contributions is problematic even in *Sawkins v Hyperion* itself. In *Sawkins v Hyperion*, Jacob LJ expressly stated that 'the sort of work done by Dr Sawkins should be encouraged. It saves others the time and trouble of re-creation of near-lost works, but in no sense creates monopoly in them. If someone wants to use Dr Sawkins' short cut, they need his permission.'[62]

There are three issues with this. First, saving others the time and effort to re-create a freely available subject matter is not a recognised objective of copyright protection. Second, the monopoly, in effect, covers the whole work thanks to making a negligible contribution (which in case of Mr Sawkins was adding or modifying a figured bass line in two compositions and re-created missing viola parts in respect of 153 of Lalande's 268 bars in one composition). Third, taking Lalande's music which is a subject matter in the public domain under the wings of Mr Sawkins' copyright resembles the objectionable practice of patent evergreening.[63]

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62 ibid [86].

63 A different view on *Sawkins v Hyperion* and other 'original recreative works' can be found in Burton Ong, 'Originality from copying: fitting recreative works into the copyright universe' (2010) 2 IPQ 165. However, the conclusions on the telling potency of the process of creation are concurring with the present view: '[I]t is submitted that the originality analysis should centre on *how* the copying process was carried out--the degree of intellectual skill, effort and labour exercised in the process of recreating the antecedent work.' ibid 178.

There is a compelling reason for treating human-AI productions and the work of joint authorship of Martin and Kogan or Sawkins's editions of Lalande's music differently. While the latter (Martin & Kogan's dramatic work or Sawkins's editions of Lalande's music) constitute authorial works by virtue of being intellectual creations due to their human origin, the former may not (or not to the full extent). No matter any potential errors in the attribution of authorship in the cases of Martin vs Kogan or Sawkins vs Lalande, the screenplay and musical compositions are expressions of human choices along the whole process of creation and hence certainly are human-authored works.

Therefore, where an AI-driven system interferes with the process of creation by making its relevant contribution (ie choosing the final form) in a manner in which it operates as the final arbiter (ie the human designers' choices are not hard coded) the human-AI production should not be considered an authorial work. Moreover, if the final arbiter is an AI-driven system, the part of *Kogan v Martin* on 'final arbiter' should not apply and the system's relevant intervention should preclude authorship of the human designers or operators. This would lead to protection of only those elements of the whole which do reflect author-creator's personality because only those part could be called intellectual creation.

3 REFLECTIONS OF AUTHORSHIP AND THE PRACTICE OF COURTS IN FRANCE

3.1 Work of the Mind

In French law, the author of a work ('a work of the mind', '*l'oeuvre de l'esprit'*) enjoys exclusionary author's rights (copyright) attached to the work on the basis of its creation.[64] In contrast to the CDPA, the text of the French Intellectual Property Code begins its author's rights part with the emphasis put on authors, their rights and the act of creation of a work. The traditional French conception of originality and its close ties with the reflection of author's personality are in a consonance with the CJEU's interpretation of the concept of work.

In France, author's rights subsist in an author's creation that takes an original form.[65] Even though the French Intellectual Property Code does not refer to originality as a general copyright subsistence criterion, it is still regarded as 'implict and undisputable'[66] that a work must be original in its form.[67] The author of a monograph on originality, Laligant, adds that the legislator suggests that the work of the mind should be 'a product of intellectual creative activity of a human being'.[68]

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64 Code de la propriété intellectuelle (Loi n° 92-597 du 1er juillet 1992 relative au code de la propriété intellectuelle, as amended as of 26 novembre 2021) ('French Intellectual Property Code') art L111-1.

65 André Lucas and Pierre Sirinelli, 'L'originalité en droit d'auteur' (1993) 23 JCP 253, 254. Pierre-Yves Gautier, *Propriété littéraire et artistique* (11th edn, Presses Universitaires de France 2019) 51.

66 Frédéric Pollaud-Dulian, *Le droit d'auteur* (2nd edn, ECONOMICA 2014) [167].

67 Criterion for protection is originality in the expression, the form. Cour de cassation, Decision of 11 February 1997, n° 95-11.605.

68 Olivier Laligant, *La véritable condition d'application du droit d'auteur : Originalité ou création?* (Presses Universitaires d'Aix-Marseille 1999) 14.

Atypically of a country with a continental law system and with legislative acts governing copyright subsistence, originality is a judge-made condition.[69] According to Professors Lucas and Sirinelli, the courts' willingness towards recognising 'the objective existence of a contribution, a personal work (without discussing banality or originality as the discriminating criterion) or […] admitting the paternity of the person to that contribution.'[70]

An analysis of French copyright cases handed down in the period from the eighteenth century to the end of the twentieth century, produced by Laligant, distinguishes two main conceptions of originality. The first conception requires imagination, personal ingenuity, fruit of an intellectual conception or a personal emotional imprint (subjective originality).[71] The second one requires a work to be new, distinct from other works of the same genre and of such a quality that is beyond standard established in a particular artistic domain (objective originality).[72] Historically, French courts also used the notions of originality and novelty interchangeably.[73]

Laligant identified the trends in the courts' interpretations and divided their development into three consecutive phases. In their search of originality, the courts used to ask

> whether the work in question is, or is not an object of privilege (1st period[74]); followed by [asking] in a more confusing way whether the work in question is, or is not, novel, original [, sufficiently individual] (2nd period[75]); and lastly […] the

69 Lucas and Sirinelli (n 65) 254.

70 ibid.

71 Laligant (n 68) 66.

72 ibid 113.

73 ibid 98.

74 Footnote added: dated from 1793 to ca 1900, ibid 123.

75 Footnote added: dated from 1900 to 1988-1990, ibid 123–25.

> notion of "sufficient individuality" is replaced, under the effect of the supremacy of the subjective conception, by the intellectual effort (3rd period[76]).[77]

Though it is now an established doctrine that a work is protected only if it is an expression of its author,[78] the ways in which courts address originality still vary. In some cases, the courts looked for originality in the activity of creating the work. For instance, the Supreme Court let an attempt to assert originality of a work fail because 'the underlying activity [leading to creation of the work] did not translate any individual imagination nor any endeavour to [bring about a] personal creation.'[79]

In contrast, in a case involving a piece of conceptual art, the Supreme Court referred to an activity which actualised the translation of author's personality to the work: placing a word in a certain fashion, in golden letters and with a particular graphic design, in a particular setting featuring shabby door, a handle in the shape of a cross and a wrecked wall, when perceived as a whole, 'implies aesthetic choices translating the personality of the author.'[80] The fact that the assemblage did not fall into any of recognised categories of work did not pose a barrier to its protection.

In other cases, the Supreme Court omits reference to the activity but only mentions aspects of the work in question. For instance, it reproached an appellate court for founding its decision on the absence of anteriority of all the elements of the work and on 'the new character of the choices, [but failing] to specify in what [aspects] these choices bear the imprint of the personality of their author.'[81] In another case, copyright protection did not

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76 Footnote added: dated from 1988-1990 to 1999, ibid 125.

77 ibid 122.

78 Lucas and Sirinelli (n 65) 255.

79 Cour de cassation, Decision of 2 March 1999, n° 97-10.179.

80 Cour de cassation, Decision of 13 November 2008, n° 06-19.021.

81 Cour de cassation, Decision of 22 January 2014, n° 11-24.273.

subsist in relation to an object 'whose realisation was solely dictated by the function assigned to the object without [involving a] creation bearing an imprint of the personality of the author.'[82]

While in principle originality implies arbitrary choices and reflection (translation) of author's personality in the work,[83] in relation to computer programs, the courts showed a certain inclination towards different criteria. In the landmark decision *Pachot,* the Supreme Court required evidence of 'personalised effort going beyond a simple implementation of automatic and compelling logic and the effort being materialised in an individualised structure'[84] of the computer program. In another paragraph of the same decision, the requirement was framed as bringing about a work 'bear[ing] the mark of [author's] intellectual contribution.'[85]

Scholars later interpreted this as requiring manifestation of an intellectual contribution that stems from a creative activity.[86] This line of interpretation was embraced by the Supreme Court when it held that for copyright to subsist in a computer program it must be specified 'in what [aspects] the choices made by the author resulted from the creative effort bearing the imprint of his personality, or bore the mark of own intellectual contribution and personal effort of his author.'[87]

Pachot remains the authority on copyright in computer programs even after the Computer Directive came into force and CJEU's case law notwithstanding. From *Pachot,* it follows that the personal effort must be translated in an individualised structure of the

82 Cour de cassation, Decision of 28 November 2000, n° 98-17.891.

83 Lucas and Sirinelli (n 65) 256.

84 Cour de cassation, Assemblée Plénière, Decision of 7 March 1986, n° 83-10.477 (Rapp M Jonquères).

85 ibid.

86 Laligant (n 68) 82.

87 Cour de cassation, Decision of 17 October 2012, n° 11-21.641.

computer program. While *Pachot* made it clear that copyright depends on leaving a trace of author's intellectual contribution, uncertainty remains as to how to identify such a contribution.[88] In 2011, the Supreme Court approved a conclusion based on finding an intellectual contribution in 'the methods distinct from those used for existing computer programs'.[89] In 2012, the same court found insufficient to show distinctiveness of a solution proposed by the computer program in comparison to other solutions already available.[90]

Despite the established subjective originality foundations, the decisions concerning computer programs contain also clear reminiscences of the objective originality conception as they refer to an individualised character and distinctiveness of the work. Moreover, they suggest that the author's own intellectual contribution must be demonstrated by identifying individualised and distinct features of the computer program.

In sum, a 'work of the mind' requires originality in the sense of a work amounting to a creation (of a form) (i) reflecting author's personality or (ii) personal effort of the author (in case of computer programs).

Despite courts' and scholars' fixation on the concept of originality as the 'cornerstone'[91] of author's rights, as professors Lucas and Sirinelli point out, 'in the chronological order of questions, the problem of originality should arise only in the second place, after determination of works that are, by nature, susceptible of entering the domain of literary and artistic property'.[92] That means asking whether the subject matter takes a certain form. According to Professor Gautier, concretisation of an idea, it is 'an act of

88 Lucas and Sirinelli (n 65) 257.

89 Cour de cassation, Decision of 22 September 2011, n° 09-71.337.

90 Cour de cassation (n 87).

91 Lucas and Sirinelli (n 65) 253.

92 Lucas and Sirinelli (n 65) 259.

arriving at a sufficient precision as to the future work […] it is the determination of contours that are not of a vague theme, [nor have their] subject still blurry.'[93] The form must be perceivable by the human senses, identifiable with objectivity and precision and provable. It must not rest solely in function and merge with ideas.[94] Among the subject matter not of the right form, one finds beauty contests, a method of commercialisation of a work, an idea of a TV programme or edition of works which merely share a certain number of common characteristics.[95]

What role is there for typology and categorisation of works in French copyright law? Comparatively to the UK, not a prominent one. Article L112-2 of the French Intellectual Property Code lists objects that are, by way of example, works of the mind. Scholars offer their definitions of types of work, eg Gautier defines a literary work as an object communicating thoughts fixed in writing and perceived with sight as well as those expressed vocally[96] or Desbois defines musical work as a composition of melody, harmony and rhythm.[97]

The doyen of French copyright law,[98] Henri Desbois, distinguished literary works, musical works and works of art on the basis of their distinct processes of creation.[99] He identified the stages of creation of a literary work as 'ideas, composition, expression'.[100] In contrast, making a work of art, according to him, does not involve ideas and personal,

93 Gautier (n 65) 58.

94 Christophe Caron, *Droit d'auteur et droits voisins* (6th edn, LexisNexis 2020) 67–82.

95 André Lucas, *Propriété littéraire et artistique* (5th edn, Dalloz 2015) 15.

96 Gautier (n 65) 61–72.

97 Henri Desbois, *Le droit d'auteur en France* (3rd edn, Dalloz 1978) 134.

98 André Bertrand, *Droit d'auteur* (3rd edn, Dalloz 2010) 204.

99 Desbois (n 97) 11.

100 ibid.

manual execution of the expression is necessary for copyright subsistence.[101] Musical works constitute creations of form 'in a pure state'[102] representing abstract art, because 'they resists comprehension or rather they lend themselves to all the interpretations, each of the listeners introducing their own suggestions therein, the aspirations of its [the work's] appropriate personality'.[103]

However, it appears that defining and categorising types of work is something on which academics more than courts dwell. According to the Court of Appeal in Paris, the protection does not depend on whether the subject matter is of a specific genre but 'only on its original character'.[104] Similarly, the fact that a textbook is not specifically mentioned among the statutory categories does not carry any drawbacks for its copyrightability.[105] In other cases French courts have recognised author's rights in hairstyles, webpages, sound and light performance, etc.[106]

3.2 Courts' Epistemic Approach to the Criteria

The next question is whether and if so where and how courts actually check fulfilment of the criteria. Originality is treated as a question of law by French courts. As such, it requires a legal assessment and cannot be delegated to an expert. Yet, experts may assist with identifying any facts and pointers towards its recognition.[107] Making a conclusion on

101 ibid 12–13.

102 ibid 14–15.

103 ibid 14–15.

104 Cour d'appel de Paris, Decision of 28 February 2007 (2007) 212 RIDA 312.

105 Cour d'appel de Paris, Decision of 21 November 1994 (1995) 164 RIDA 381.

106 André Lucas, Agnès Lucas-Schloetter and Carine Bernault, *Traité de la propriété littéraire et artistique* (5th edn, LexisNexis 2017) 97-98.

107 Michel Vivant and Jean-Michel Brugière, *Droit d'auteur et droits voisins* (3rd edn, Dalloz 2016) 325.

whether a work is original is a domain of judges of the first instance. In the past few decades, the Supreme Court started gradually to exercise more control over its interpretation.[108]

To reiterate, it is generally accepted that originality must be manifested in the form.[109] In addition, originality must be manifested in certain aspects of the form, since originality 'does not lie in the style but in the manner in which it is materialised and expressed in a particular form.'[110] For instance, it has been established that in a musical work, originality can be found in the melody, rhythm and harmony.[111] A novel can be original in its composition, including an outline or a construction, as well as its execution, including editing or style, etc.[112] This suggests that courts tend to engage with the final result rather than the process of creation.

Even though all works adhere to the same standard of originality,[113] originality manifests itself differently according to the respective genre of the work.[114] The burden of proof in relation to facts relevant to establish originality of a work is placed on the copyright owner[115] but the courts usually do not verify the existence of originality.[116]

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108 Carole Thomas-Raquin and Martin Le Guerer, 'Le controle de l'originalité d'une oeuvre par la Cour de cassation' [2017] Comm Com Électr 90.

109 Pollaud-Dulian (n 66) [170].

110 Pierre Sirinelli, 'Chronique de Jurisprudence' (2010) 226 RIDA 394.

111 Pollaud-Dulian (n 66) [209], [229]. Similarly Vivant and Brugière (n 107) 324.

112 ibid.

113 Pollaud-Dulian (n 66) [286].

114 Laligant (n 68) 19.

115 TGI de Paris, Decision of 6 October 2009 (2010) 226 RIDA 506.

116 Lucas and Sirinelli (n 65) 260.

According to Lucas and Sirinelli, '[i]n practice, originality is rarely denied. It is, in fact, presumed, too.'[117] Professor Vivant makes a similar observation that, in practice, the courts treat the traditional works of literature and fine arts as a priori eligible for protection and hence 'we are not far away from protecting a genre'.[118] Caron concurs by noting that 'in practice, the question of originality arises only in relation to a few types of subject matter: [namely] software, indutrial art, […]', and instead of examining originality, the judges 'de facto use presumptions of originality that rely on common sense'.[119] More precisely, the judges rely on the statutory presumption of authorship and infer originality from it.[120]

As argued here, such a practice is contrary to the principle of examining originality of each work individually. In relation to the less traditional types of work such as computer programs or photographs, however, courts tend to discuss originality more often. In such cases they showed more curiosity as to actual proofs of originality. For instance, the court in Paris held that the author is obliged 'to explain why there is originality in the choices made in the process of designing and making the database'.[121] In another case, an author was successful in demonstrating originality of his photographs by explaining his own creative choices made in the course of creation of the examined photographs.[122] As observed here, once originality is in question, the fulfilment of the originality criterion is to

117 ibid 255.

118 Michel Vivant and Jean-Michel Brugière, *Droit d'auteur et droits voisins* (4th edn, Dalloz 2019) 342–43.

119 Christophe Caron, *Droit d'auteur et droits voisins* (5th edn, LexisNexis 2017) 91. A similar account in favour of the existence of originality presumption is offered in Pollaud-Dulian (n 66) [180].

120 Sirinelli (n 110) 454.

121 Pierre Sirinelli, 'Chronique de Jurisprudence' (2011) 230 RIDA 143, 172.

122 Sirinelli (n 110) 426.

be demonstrated by explaining how the required effort translates the author's personality or the author's intellectual contribution to the final creation.

In conclusion, in the absence of a legislative definition of originality and given the inconsistent definitions offered by courts, the concept of originality remains a 'notion of variable geometry'.[123] In practice, French courts appear to search for originality, if at all, in the process of creation and, almost exclusively, in relation to the less traditional types of work such as computer programs, databases, or photographs. Though this may well be due to these works being challenged before the courts more often. In relation to the more traditional works, the examination of originality seems to be superseded by the presumption of authorship.

3.3 Application of the French Copyright Subsistence Criteria to Human-AI Productions

From the present analysis of the case law, it follows that French courts have some chance to discover that a human-AI production does not have any author on the basis of the human aspects of copyright subsistence criteria when they deal with less traditional categories of subject matter such as photographs, pieces of applied art or conceptual art. Examination of the process of creation increases their chances to detect a form of expression without a human author.

However, when the human-AI productions are computer programs, the originality test is a special one and focused on distinctiveness rather than human origin. The mere manifestation of objective originality in individualised and distinct features of the computer

[123] This idiom is attributed to the counsellor Jonquères according to Laligant (n 68) 19. Similarly Lucas, Lucas-Schloetter and Bernault (n 106) [124].

program need not mean that these features are due to the (human) author's own intellectual contribution and hence they need not be indicative of subjective originality.

The French legislation does not provide for protection of CGW. Bertrand refers in this connection to the conclusions of the Committee of governmental experts stating that only persons who furnished 'the elements of creation without which the final work would not have been object of protection by author's rights'[124] could be entitled to enjoy author's rights.

There are cases discussing protection of a computer-assisted subject matter which support this position. In one of them, a first instance court in Paris abstained from examining contributions of a computer. The defendant asserted that he had tasked one of the assistant stylists in a design studio to try out different trials and studies of a design with the said graphics on the computer material of the 'creation assisted by computer' according to his own instructions.[125] The court rather focused on the contributions of the claimant and those were found of not a sufficient specificity to give rise to author's rights.

Similarly, the Court of Appeal in Bordeaux found that a layout of a lorry storage that served to accommodate storing units designed with the aid of a computer was a work provided that 'it shows, at least minimally, originality which the person who conceived it wanted to contribute.'[126] Again, the court preferred to look at the relevant contribution of a human being and hinge any ensuing protection on it regardless of any computer contributions.

In France, the scope of protection of a work covers the 'verbatim' expression. Beyond the form of expression itself, the composition is protected to the extent that depends on, as

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124 Bertrand (n 98) 107.

125 TGI de Paris, Decision of 27 June 1997, PIBD 1997 III 661.

126 Cour d'Appel de Bordeaux, Decision of 31 January 2005 as cited in André Kéréver, 'Chronique de Jurisprudence' (2005) 204 RIDA 298.

put by Bertrand, '"capillarity" of its originality. The composition of a work is not original as a whole; it is [original] by multitude of elements that are interlocked into each other.'[127]

Importantly, infringement can be claimed only in relation to the taken parts that are sufficiently recalling the personality of their true author.[128] Parts of work that are commonplace and do not translate author's personality do not attract protection.[129] Thus the problem of unjustified scope of protection for human-AI productions with some minimal authorial contribution, which is likely to arise in the UK, should not arise in France because the protection should follow originality, ie the elements reflecting personality of their author.

4 REFLECTIONS OF AUTHORSHIP AND THE PRACTICE OF COURTS IN GERMANY

4.1 Protected Works

Pursuant to § 2(1) of the German Author's Rights Act, the following belong to the protected works of literature, science and art: literary works, such as written works, speeches and computer programs, musical works, pantomimic works, including works of dance, artistic works, including works of architecture and of applied art, etc.

Pursuant to the following paragraph of the same [§2 (2)], 'Works in the sense of this statute are only personal intellectual creations.'[130] A more readable version of this verbatim

127 Bertrand (n 98) 279.

128 ibid 282.

129 ibid 282–83.

130 Urheberrechtsgesetz of 9 September 1965 (BGBl I S 1273), as amended by the statute of 28 November 2018 (BGBl I S 2014) ('German Author's Rights Act') § 2(2).

translation would be: 'Only those subject matter that are personal intellectual creations are works in the sense of this statute.' At any rate, the wording of the statute indicates that the concept of 'protected works' is conditioned on the works being 'personal intellectual creations'. This arrangement corresponds to the reading of the excerpt from *Infopaq* 'the protection of certain subject-matters as artistic or literary works presupposes that they are intellectual creations'[131] in its conditional meaning, ie a subject matter is required to be an intellectual creation to qualify for a protectable literary or artistic work (Chapter V.).

Normally, the categorisation of subject matter 'plays no role'[132] in German author's rights with the exception when special norms are to be applied with respect to certain kinds of work such as paintings or films.[133] The categorisation used to have its meaning for works of applied art for which there used to be a higher originality standard, however, this approach seems to have become against the CJEU's ruling in *Cofemel*.

As far as the content of the categories is concerned, there are no surprises. As elsewhere in Europe, there are kinds of work falling straightforwardly into a category such as a novel or a song and there are kinds of work at the edge such as food recipes or contextual art.[134] For instance, literary works are understood as works of language expressing the 'ideas inhering in the content' (*der Gedankeninhalt*) through letters or other signs.[135] A musical work consists of tones of any sort that must be brought in by a human

131 Case C-5/08 *Infopaq International A/S v Danske Dagblades Forening* [2009] ECR I-6569, EU:C:2009:465, para 34.

132 Gernot Schulze, 'UrhG § 2 Geschützte Werke' in Thomas Dreier and Gernot Schulze (eds), *Urheberrechtsgesetz* (6th edn, CH Beck 2018) [79].

133 ibid.

134 Matthias Leistner, 'UrhG § 2 Geschützte Werke' in Gerhard Schricker and Ulrich Loewenheim (eds), *Urheberrecht* (6th edn, CH Beck 2020) [133] and [173].

135 ibid [100].

being, it can be improvised but must be fixed.[136] Whether a subject matter is artistic (and hence falls into the category of artistic work) would be judged objectively and on the basis of how experts and general public view the work.[137]

4.2 Personal Intellectual Creation

In Germany, the requirement corresponding to originality, ie personal intellectual creation, is enshrined in the §2 (2) of the German Author's Rights Act.[138] German legal scholarship, which is traditionally highly regarded and followed by German courts, further elaborates that there are, in essence, four originality sub-criteria within the §2 (2) provision. In order to attract copyright, the work must be (i) a personal creation of its author, (ii) featuring an intellectual content, (iii) existent in a perceivable form and (iv) expressive of individual character of its author.[139]

These definitional elements of personal intellectual creation are suitable for bringing the EU's author's own intellectual creation into life. In particular, there is an evident overlap of the 'individualised character' and author's 'personal creation' criteria with the EU requirement of stamping the work with an author's personal touch.

To discuss the elements one by one: under the 'personal creation of its author' criterion, it is understood that the work rests on human creative activity of the author.[140]

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136 Schulze (n 132) [134], [135].

137 ibid [61], [62].

138 German Author's Rights Act, § 2(2).

139 Ulrich Loewenheim, *Handbuch des Urheberrechts* (2nd edn, CH Beck 2010) 55. Marcel Bisges, *Handbuch Urheberrecht* (Erich Schmidt Verlag 2016) 51–57. Or, alternatively, as put by Schulze, the protected work must amount to (i) a personal creation, (ii) an intellectual creation and (iii) a creation (in a sense of a result of employing creative forces, ie die Schöpfung) (whereby the Loewenheim's fourth condition—the individual character—is covered within the third criterion by Schulze) in Schulze (n 132) [8]-[18].

140 Leistner (n 134) [38].

The question is whether the creator of the underlying work was a human being and any machine potentially involved was used as a mere tool over which the human creator had control.[141] In terms of human aspects, this sounds promising. However, in practice, the human aspects of creation are present as soon as a human being chooses to present something they found such as a stone or a tree branch as a piece of art.[142]

The second criterion of a work featuring intellectual content requires a human being active in creating their work and in communicating content incorporating ideas or emotions originating from them.[143] Equally, within this criterion, the work is supposed to have educating, entertaining or other somehow stimulating effects on its human recipients.[144]

In one case, the Higher Court in Düsseldorf found that a phrase 'We drive, drive on the highway' was deprived of any concrete intellectual content because the repetition of 'drive' may be understood as evoking the flow of the journey and hence describing the journey on the highway, or the distance to be driven, the speed of driving or the length of the journey, the joy from driving or the burden of driving.[145] Due to the high number and the differences in interpretations (and hence plausible intellectual contents) this group of words was found not to carry any concrete idea.

In contrast, the phrase was found to be a mere dependent building element to which something needs to be added in order to embody a protection-worthy intellectual content and for this reason it is not, by itself, eligible for protection.[146] Similarly, on the ground of lack of concrete intellectual content, a typographical arrangement of publications was

141 Schulze (n 132) [8]. Loewenheim (n 139) 56.

142 Schulze (n 132) [9].

143 Loewenheim (n 139) 56.

144 Schulze (n 132) [12].

145 Decision of 1 December 1977, 20 U 46/77 [1978] GRUR 640, 641.

146 ibid 641.

denied copyright protection because only 'certain, concrete works being characterised with "ideas inhering in the content" [*der Gedankeninhalt*] are eligible for copyright protection'.[147]

The third criterion of protection requires a work to be developed to such an extent that it is perceivable by human senses. This requirement also relates to fixation of the work and even a temporary fixation is sufficient.[148]

The fourth criterion, the individualised character of the work born from its author ('*die Individualität*'),[149] is required as an expression of author's creative forces. When determining such individualised character, the courts will closely examine the final creation in question:

> It is aesthetically pleasing and stemming from the expressive forces. The details are formed in a fine manner: on the whole this piece of jewellery demonstrates a skilful representation and self-standing […] interpretation of a thistle as it occurs in the nature.[150]

By the same token, in case of a musical work, the 'creative individualisation' lies within its own individualised aesthetical expressive power.[151] Yet, standards for the individualised aesthetical content should not be set too high so that pop-music can be covered.[152]

In the *Pippi Longstocking* case, however, the Supreme Court found that in relation to characters, the criterion is strict: 'An individual character of a literary work […] can enjoy independent copyright protection on condition that the author gives this character a

147 Decision of 20 September 1955, I ZR 194/53BGHZ 18, 175/177 [1955] NJW 1753, 1754.

148 Schulze (n 132) [13].

149 Loewenheim (n 139) 57.

150 Decision of 22 June 1995, I ZR 119/93 [1995] GRUR 581.

151 Decision of 26 September 1980, I ZR 17/78 [1981] GRUR 267, 268.

152 ibid. The same more recently in Decision of 16 April 2015, I ZR 225/12 [2015] GRUR 1189.

distinctive personality through the combination of pronounced character traits and particular physical features'.[153]

In 1995 two artists commissioned wrapping of the Reichstag in a thick woven polypropylene fabric with an aluminium surface.[154] The High Court in Berlin found that copyright subsisted in the work because it was 'distinguished by its especially high level of individuality.'[155] The project allegedly manifested 'a special level of creativity'[156] namely through the constant change of shades of colours and movements of folding of the wrapping that were caused by the flow of wind and light.

In another case, a chair was subject to an examination in course of which the constituting elements of the characteristic aesthetic content inherent to that chair were ascertained and analysed.[157] In general, the individual character expressed in the work would be assessed on the basis of an expert opinion or other indications such as the work being exhibited among other works of art, reception of an award or appearance in a publication on art.[158]

Furthermore, the individualised character of the work justifying copyright protection may be ascertained by comparing the work in question with the plain and ordinary arrangement of elements or with previous works:

> This comparison does not entail […] any novelty examination […], but it just answers the question of whether the concrete design distinguishes itself from previously known designs through individual particularities.[159]

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153 *Pippi-Langstrumpf-Kostüm*, Decision of 17 July 2013, I ZR 52/12 [2014] IIC 467.

154 Anonymous, 'Wrapped Reichstag' (*christojeanneclaude*, undated) <https://christojeanneclaude.net/artworks/wrapped-reichstag/> accessed 21 April 2021.

155 Decision of 30 January 1996, 5 U 7926/95 was affirmed by the Federal Supreme Court, *Wrapped Reichstag – Christo*, Decision of 24 January 2002, I ZR 102/99 [2003] IIC 570.

156 ibid.

157 Decision of 27 May 1981, I ZR 102/79 [1981] GRUR 820, 822.

158 Schulze (n 132) [61], [62].

159 *Inkasso-Programm*, Decision of 09 May 1985, I ZR 52/83 [1985] GRUR 1041, 1047.

A literary work inspired by a preceding, well-known novel does not hold an individualised character nor represents a sufficient departure from its source of inspiration if the borrowed parts did not 'fade away and retreat' in the new novel.[160]

4.3 Courts' Epistemic Approach to the Criteria

As follows directly from the German Author's Rights Act, finding a protected work is conditioned upon establishing a personal intellectual creation. On top of what is required at the EU level, there is 'the intellectual content' criterion which appears to be the closest reflection of human authorship in German copyright law.

German courts approach the question of copyright subsistence as a question of law.[161] In the normal course of action, German courts would rely on manifestation of personal intellectual creation in the result rather than in the process of creation. The courts tend to rely on their own impression from the subject matter and indications of originality as perceived from their intellectual engagement with the subject matter or opinion of the audience.[162] According to Bullinger, German authorities are confident to pass such sensory judgments because the questions of copyright subsistence fall within the remit of expert departments, expert chambers at courts or expert senates at higher courts and 'the judges are therefore and thanks to their constant practice familiar with the material including from the factual side'.[163]

This focus on the result may be due to the way in which the requirement of work is defined in the German Author's Rights Act. Since it is defined by means of a work of

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160 Decision of 29 April 1999, I ZR 65/96 [1999] ZUM 644, 648.

161 Winfried Bullinger, 'UrhG § 2 Geschützte Werke' in Artur-Axel Wandtke and Winfried Bullinger, *Praxiskommentar Urheberrecht* (5th edn, CH Beck 2019) [5].

162 See also Schulze (n 161) [61], [62].

163 Bullinger (n 161) [7].

certain qualities, the work as the constituting concept is placed at the centre of attention. Therefore, it is logical that courts would prefer to benchmark an object rather than a process against the statutory definition of a work. Understandably, it is more natural to compare an apple against an ideal apple.

In case of works that are usually created in stages, such as computer programs, the courts look at the process of creation to discern the protected works and their originality. For instance, when it comes to developing a computer program, the German Supreme Court distinguished a process of solving a problem (the result being a literary description of the solution), process of projecting the solution (the result being a graphic representation of the solution) and the process of coding itself.[164] Though these stages and their outcomes are recognised in the copyright assessment, the copyright protection covers only 'the form and manner in which the materials are gathered, selected and arranged.'[165]

The room for making individual and creative choices as to the solution is recognised in all the three phases.[166] Copyright subsists in a computer program if its concrete form is characterised by 'individual properties' compared to known and common arrangements.[167] The approach taken in *Inkasso-Programm* is not dissimilar to the Debois' staged creative process of writing a literary work containing creation of ideas, composition and expression.

Even though the *Inkasso-Programm* case may seem outdated and overruled by *Football Dataco*,[168] it remains to be referred to as the authority in the newest editions of

164 *Inkasso-Programm* (n 159) 1046.

165 ibid 1047.

166 ibid.

167 ibid.

168 *Football Dataco* (n 37).

academic as well as practitioner's commentaries.[169] This exceptional attention paid to the process of creation does not, however, present any novel epistemic approach because, at the end of the day, the assessment is about comparing a subject matter (computer program) at hand with other subject matter of the same kind known to date.

4.4 Application of the German Copyright Subsistence Criteria to the Human-AI Productions

The methods that German courts employ to adjudicate the intellectual content criterion shows the most promise in distinguishing between authored works and human-AI productions that entirely or partly lack a human author. As it follows from the *'We drive, drive on the highway'* case, once a form of expression offers too many different interpretations as to the ideas inhering in the content (*der Gedankeninhalt*), it is doubtful that it will be found to constitute a personal intellectual creation. A variety of plausible interpretations of a human-AI production is likely to arise because of the lack of capability to fill the content with ideas.

As the other sub-criteria, eg individuality or perceivability, focus on external features of the expressive subject matter, they may not prove helpful for the present purpose. The sub-criterion of a personal creation of its author should focus exactly on the issue of whether the expressive subject matter was authored by a human being. If there is an authorless expressive subject matter and the 'intellectual bond between the work and the creator' is missing, no author's rights arise.[170] However, whether this is or will be checked by courts

[169] Dorothee Thum, 'UrhG § 8 Miturheber' in Artur-Axel Wandtke and Winfried Bullinger, *Praxiskommentar Urheberrecht* (5th edn, CH Beck 2019) Rn 44. Schulze (n 132) [126].

[170] Tim Dornis, 'Der Schutz künstlicher Kreativität im Immaterialgüterrecht' [2019] GRUR 1252, 1255. Simlarly Sven Hetmank and Anne Lauber-Rönsberg, 'Künstliche Intelligenz – Herausforderungen für das Immaterialgüterrecht' [2018] GRUR 574.

on their own motion is questionable. (How difficult it is to challenge the presumed author was described in Chapter IV.)

As Professors Loewenheim and Leistner write, even when the results of human work and computational creativity can hardly be distinguished from each other, the German Author's Rights Act protects only human creative achievement and not results produced by a machine.[171] Moreover, they argue that an exceptional treatment may be received by a person who creates an essential basic plan for the work and makes a choice out of various versions of the work generated by a computer.[172]

As for the unjustified scope of protection for human-AI productions with some minimal authorial contribution, the German Supreme Court keeps the scope of protection within reasonable limits corresponding with human authorship. It explicitly favours a scope of protection corresponding to the expressive elements brought about by the author:

> the aesthetic effect of the form can justify protection by author's rights to the extent to which it is not owed to the utilitarian purpose […]. Besides, it is to be noted that although it [the aesthetic effect] justifies protection by author's rights, nonetheless a small level of creativity leads to a correspondingly narrow scope of protection of that work.[173]

5 CONCLUSION

In the UK, a subject matter must first fall into a statutory category and only after the bar of categorisation is cleared it can be assessed as to its originality. The categorisation exercise and the closed list of categories survived the CJEU's interpretation of work in *BSA* and *Cofemel*. After Brexit it is difficult to imagine new attempts of abandoning the

171 Leistner (n 134) [39].

172 ibid [41].

173 *Geburtstagszug*, Decision of 13 November 2013, I ZR 143/12 [2014] GRUR 175.

categories.[174] The advantage of categories is that they contextualise the relevant creative activity for the originality assessment. (Though this method is not infallible as *Ladbroke v Hill* demonstrates.) The downside is that the hands of courts are tied with traditions and ordinary meanings of categories which makes the assessment rather conservative.

When it comes to human authorship implicit in the copyright subsistence criteria, there is a requirement of person's own intellectual input that is of sufficient transformative character and poured into the activity of creating a particular type of work at the level of work's conception as well as its realisation. Though this reflects some need for human authorship, the interpretation of the UK criteria could benefit from following more closely the CJEU's criterion of reflection of author's personality in the work. For instance, it would be curious to see how *Sawkins v Hyperion* would have been decided had the court sought to identify Mr Sawkins's personality in the final work. Had Mr Sawkins expended such a personal creative activity in reviving Lalande's work that he would have effectively transformed it and stamped the result with his personality?

In France, the concept of work depends on the conception of originality having more weight than the categories of work. These are listed only by way of example and new types of work such as pieces of conceptual art are well-accommodated thanks to their belonging to a more abstract category of literary and artistic works. The French 'work of the mind' requires originality in the sense of reflection of author's personality or author's personal effort. This clearly reflects the human aspects of the criterion of work.

However, French courts seem to be satisfied upon perceiving an expressive subject matter that belongs to literary or artistic domain. The exceptions are less traditional works

[174] The UK retains a fluid, closed-list subject matter. *Response Clothing Ltd v The Edinburgh Woollen Mill Ltd* [2020] EWHC 148 (IPEC), [2020] FSR 25 [64].

such as computer programs or photographs in relation to which the courts examine the process of creation and individual contributions in the course of that process.

The advantage of the French model of copyrightability assessment is that it is dominated by the reflection of personality. Other issues, such as objectively identifiable and perceivable form, idea/expression dichotomy, rules-free and non-technical character (creative freedom in the EU copyright idiom) are grouped together under the heading of 'form' and they appear to function as an emergency break. The French epistemic approach applied to the less traditional works such as photographs (except for the idiosyncratic approach to computer programs) seems to be the best option for refinement of the EU conception of authorship out of the jurisdictions presented herein.

In Germany, the concept of protected works is conditioned upon them being personal intellectual creations. Neither this conception of work is far from the CJEU's one. In theory, the German understanding of personal intellectual creations as featuring personal creation of the author, intellectual content and expression of individuality of the author should lead to finding the origin since all these sub-criteria depend on human aspects of creation.

However, in practice the courts seem to rely on their own impression and aesthetical judgment of the work and secondary indications of originality. The German approach is characterised by a stark discrepancy between the theoretical accounts of 'the personal intellectual creations' promising to hinge on human aspects of creation and the application practice of courts focussing almost exclusively on the subject matter and its expressivity. For this discrepancy the German approach would not be a suitable model for a new EU conception of authorship. The current EU conception is not as much in need of theoretical reinforcement of the human aspects as in want of clarifying the way in which they could be proved.

In sum, this chapter shows that human aspects are reflected in the UK, French and German copyright subsistence criteria, namely in the requirement for skill, labour, and judgement (the UK), reflection of personality (France) and personal intellectual creation (Germany). However, the currently applied epistemic approaches of courts focus predominantly on the form of the subject matter and having found it compliant with their previous experience with expressive authorial works, they infer that they have encountered another authored work.

Nonetheless, there are some promising signs of courts engaging with the process of creation as they ask for explanation of originality of choices (France) or identify ideas in the content of the work (Germany) or determine inputs of sufficient transformative character (the UK). However, outside the contexts of less traditional works (France) or less intelligible works (Germany) or joint authorship (the UK), there is a tendency of courts to skip a proper inquiry into the origin of the examined subject matter. Hence, this chapter concludes that the epistemic approaches regularly adopted by the UK, German and French courts are not robust enough to tackle the questions concerning the human origin and human aspects of work.

Given the flaws in these approaches coupled with factual assumptions about authorial works and authoring, expressive human-AI productions that lack a human author may end up being treated as protected works. Applying the copyright subsistence criteria in line with the courts' approaches, this chapter concludes the following: even if the UK courts focused more on the origin of the skill, labour and judgement and indeed found relevant human authorship, they would be led to granting a disproportionate scope of protection. To avoid the consequence of possibly unjustified scope of protection, the norms on authorial contribution (stemming from *Kogan v Martin* and *Cala Homes*) should be altered for determining authorship.

The problem of unjustified scope of protection does not arise (at least in theory) in France and Germany because there the scope of protection corresponds to the authorial contribution. Hence, only those expressive elements that reflect the personality of the author are protected. This, at the end of the day, corresponds to the CJEU's ruling in *Infopaq* that unlawful reproduction can happen only in respect of elements 'if the elements thus reproduced are the expression of the intellectual creation of their author'.[175]

[175] *Infopaq* (n 131) Ruling 1.

CHAPTER VIII.

CONCLUSIONS AND NORMATIVE PROPOSALS

1 CONCLUSIONS OF THE THESIS

Some AI-driven systems have reached a stage at which they can determine expressive elements and inventive technical features of their outputs in the absence of relevant human intervention or understanding. In addition, these outputs resemble human-made works and inventions so closely that they are often indistinguishable. Against these developments in AI and their impact on the processes of creation and inventing, this thesis posed the following original question. When the authorities encounter expressive subject matter lacking a human author or inventive technical subject matter lacking a human inventor, will they distinguish them from human-authored works and human-devised inventions?

The short answer is that likely no. The authorities usually do not employ such epistemic approaches that would enable them to make the distinction. They focus almost exclusively on whether a subject matter has (convincingly) expressive or inventive technical properties without taking into consideration the underlying human activity qualifying the subject matter for protection.

More specifically, the invention test suffers from focusing solely on whether a subject matter falls within any of the technical fields and rarely examines whether it amounts to a human creation at all. The inventive step test takes the underlying necessary human intellectual activity for granted and is limited to the inventive quality of the invention. The inquiry whether a subject matter constitutes an authorial work is reduced to engaging with its expressive elements. Upon reading an arrangement of words which contains a rhyme

and rhythm typical for a poem, the authorities infer that it is a poem which is traditionally regarded as a human intellectual creation. Admittedly, such inference is supported by the statutory catalogues of works and established assumptions about poems, music or paintings being created by human beings. The authorities practically infer the cause—the human author—from the effect—the poem.

As the present research shows the statutory texts are not at fault. They appropriately conceive of works and inventions as human intellectual creations and formulate the copyright subsistence and patentability requirements accordingly. These requirements reflect the human aspects of creating and inventing sufficiently and with the aid of teleological interpretation even more clearly. The failings are due to inadequacy of the interpretation and application practices.

In Chapters VI. and VII., copyright subsistence requirements were applied to human-AI productions in line with authorities' practices to illustrate the possible application scenarios. This exercise also revealed that even in cases of limited human authorial contributions, the UK authorities would tend to grant a scope of protection disproportionately larger than the contributions justify. This should not happen in Germany and France where the scope of protection should, in theory, follow the elements reflecting author's personality. Since the current epistemic approaches employed in patentability assessment provide almost no means to detect the lack of human inventorship, the application exercise was not conducted in the patent law part.

The situation sketched out above begs a question worthy of few lines of discussion. To what extent the conceptions of authorship and inventorship should be determined by legal rules and legal guidance produced by authorities as opposed to the facts of the case and practices in the industry? On the one hand, authorship and inventorship are currently

treated mainly as questions of fact.[1] To recall, the act of creation and the act of invention are real factual acts. Hence, authorship or inventorship are established on the basis of information coming from the current practices of production of works or inventions. This is only reinvigorated by the legal presumptions of authorship and statements of inventorship. In principle, a person who publicly presents themselves as the author or the inventor is deemed to be the author or the inventor respectively.

On the other hand, as Professors Biron and Bently point out, 'copyright law needs a conception of authorship that can be applied across a great diversity of cultural fields'[2] and hence be broad and abstract enough to encompass the real-life diversity. They list the following downsides of social determination of the legal concept of authorship: the social norms and practices may not be stable enough, it may be impossible to align the concept with the sheer variety of creative practices and, lastly, the concept could internalise the power relations already existing in the society.[3] By analogy, the same applies to the conception of inventorship in relation to its suitability to a diversity of technical fields.

This thesis argues that authorship and inventorship conceived of as factual creating and factual inventing may be good servants (to the established assumptions) but bad masters. At the end of the day, treating them as a matter of fact means merely giving a court stamp on the established social practices. In the future, this may lead to discrimination among the cultural and technical fields on the basis of their implementation of AI-driven systems in their processes of creation. In some, an AI-driven system may become regarded

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1 Besides the national laws researched in Chapters III. and V., this is also supported at the EU level. Recital 14 of the Term Directive states that 'The question of authorship of the whole or a part of a work is a question of fact which the national courts may have to decide.'

2 Laura Biron and Lionel Bently, 'Discontinuities between legal conceptions of authorship and social practices. What if anything, is to be done?' in Mireille van Eechoud (ed), *The Work of Authorship* (Amsterdam University Press 2014) 260.

3 ibid 259-262.

as a genuine creator by way of custom, but not in all, or not as quickly. With this laid-back approach, the law would have to accept such developments despite the inconsistencies and fragmentation they will produce.

Additionally, the technological changes in the creative processes call for a conception of authorship that is somewhat narrower and selective so that the scope of protection is limited to those subject matter or those of their elements that are true human intellectual creations. Should the essence of copyright as rights for authors-creators be sustained this call should be answered. In patent law, this issue does not arise due to a greater disconnect between inventorial contributions and the scope of protection.

Given the above, this thesis advances a more normative approach and thus approaching the act of creation of a work and the act of creation of an invention as implicit legal requirements. This approach would eventually tip authorship and inventorship towards becoming questions of law. In the future, this would enable legislators and courts to set out more specific legal conditions for authorship and inventorship. Ultimately, the law would normatively select activities (in addition to the subject matter) sufficiently important to reward, incentivise etc. by copyright and patents with the effect of increased legal certainty and stability.

For the moment, the present thesis proposes that in order to distinguish human intellectual creations from other subject matter, the authorities should interpret the statutory copyright subsistence and patentability criteria in the light of the implicit human authorship and human inventorship requirements. More concretely, the aspects of authorial and inventorial contribution that play a crucial role in the context of entitlement, namely their specificity and their presence in the circumscribed process of creation, should be equally required and scrutinised in the context of application of the statutory copyright subsistence and patentability criteria.

To achieve this, the contours of the conceptions of human authorship and human inventorship should be sharpened and the conceptions should be recognised as normative standards. Further, the authorities should amend their epistemic approaches to copyright subsistence and patentability criteria so that they focus on the process of creation or inventing with the ultimate view of checking whether the expressive elements or inventive technical features owe their existence to the relevant human intellectual creative activity.

1.1 Refining the Conceptions of Human Inventorship and Authorship

The exercise of refining the conceptions of authorship and inventorship also relates to the framing of the AI and IP debate made in Chapter II. As suggested therein, the starting position should be to formulate solid, abstract legal concepts of authorship and inventorship. Then, the legal concepts would be applied to the facts of each individual case and if the facts reveal that a de facto human endeavour corresponding to those legal concepts indeed occurred, the resulting subject matter will constitute a human intellectual creation.

In the event the corresponding human intellectual creative activity was not involved in the process, the resulting subject matter does not amount to a human intellectual creation and hence it falls outside the current patent and copyright systems. Put in other words, the current patent and copyright laws are not applicable to such human-AI productions. To make this proposal working, the relationship between authors and their works and inventors and their inventions should be expressly appreciated and the conceptions of human inventorship and authorship should become more nuanced.

As mentioned in Chapter III., the law recognises the relationship of inventorship in the form of a right to file a patent application even before (and logically so) the inventor applies for a patent. Hence, inventorship has legal effects preceding the grant of a patent.

In addition, inventorship is protected even when a patent is not granted, eg the inventor was the second-to-file, by a right to continue use begun before priority date.[4]

Building on research documented in Chapter III., human inventorship should be conceived of as relationship established by a human creative intervention[5] and human intellectual activity of inventive quality involved in a circumscribed process of creation. This process of creation amounts to the process of coming up with the inventive concept in the UK, the process of solving a concrete technical problem and disclosing the teaching in Germany and the process of conceiving the essence of invention in France.

Under the current patent law doctrine in the selected jurisdictions, the process of inventing is understood narrowly and is limited to the intellectual activities expended in the immediate solving of the underlying technical problem. Activities such as contributing the technical features known in the prior art, entrepreneurial or managerial contributions, providing funding, labour, setting up tools, testing prototypes or fulfilling other assistant tasks do not give rise to inventorship because they do not immediately form the solution of the technical problem. This usus should be elevated to a normative status and become part of the refined conception of human inventorship in those jurisdictions.

At the European level, the European Patent Convention ('EPC') Contracting States should launch a debate on inventorship anew. Historically, the states agreed that they had disagreed on inventorship and derivation of title to a patent (Chapter III.). But this was roughly fifty years ago and since then their economies have become much more interdependent and the EU harmonisation of substantive laws has progressed in a manner unimaginable back then. In addition, the Legal Board of Appeal of the European Patent

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4 Patents Act 1977, s 64; Patentgesetz of 16 December 1980 (BGBl 1981 I S 1) ('German Patent Act') § 12, Code de la propriété intellectuelle (Loi n° 92-597 du 1er juillet 1992 relative au code de la propriété intellectuelle, as amended) ('French Intellectual Property Code') art L613-7.

5 *Rote Taube*, Decision of 27 March 1969, X ZB 15/67 [1970] IIC 136, 138. *Tomatoes/State of Israel*, G 0001/08 of 9 December 2010, EP:BA:2010:G000108.20101209 [6.4.2.3].

Office (to some surprise) has recently found itself competent to decide on inventorship under the Article 60(1) EPC.[6] This could be taken as a signal of willingness (or necessity) towards a common approach to inventorship for European patent purposes.

Harmonisation of the concept of inventorship and delegation of the respective competence to the European Patent Office would make sense also considering the European unitary patent system.[7] Pursuant to Regulation No 1257/2012, art 7(1) the unitary patent as an object of property will be governed by national laws of the state where the applicant had his residence or place of business on the date of filing of the application for the European patent. In effect, if only one of the states accepts inventorship by a machine in their national law, the applicants with technical solutions without human inventors would just need to set up a place of business in that state and apply from there. (Though when dealing with the European Patent Office, pro forma they would have to name a human being as the inventor). If none of the applicants has residence or place of business in any of the states (the Contracting Parties of the Agreement on a Unified Patent Court), the unitary patent as an object of property will be governed by German law.[8]

The lack of a conception of human inventorship shared by the EPC Contracting States and the lack of an explicit agreement on whether machines can be recognised as inventors under the national laws of the EPC Contracting States only adds to the current inadequacy of the interpretation and application practices and thus potentially contributes to generating false positives by the European patent system.

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6 More specifically, on the question of whether ownership and creation of an AI-driven system is sufficient to claim inventorship, see Chapter II.

7 A system of enhanced cooperation established by the Agreement on a Unified Patent Court 16351/12 [2013] OJ C 175 (pending notification), Regulation EU 1257/2012 implementing enhanced cooperation in the area of the creation of unitary patent protection [2012] OJ L 361 and Regulation (EU) No 1260/2012 of 17 December 2012 implementing enhanced cooperation in the area of the creation of unitary patent protection with regard to the applicable translation arrangements [2012] OJ L 361.

8 Regulation (EU) 1257/2012, art 7(3).

Formulating an EU conception of human authorship presents its own challenges due to the incomplete harmonisation of the EU copyright law. At the EU level, it is argued that human authorship amounts to a relationship established through choosing, sequencing and combining the building blocks of a subject matter so that it reflects personality of those who made the decisions as to that choice, sequence and combination. Such an EU conception of human authorship depends on accepting the following: (i) the interpretation of creative choices as choices that immediately lead to creation of the work, (ii) *Cofemel*'s emphasis on the reflection of personality as the substantive core of the EU concept of work and (iii) *Brompton Bicycle*'s directive to look for the personal creative choices in the process of creation.

At the national level in the selected jurisdictions, it is well established that the conception of human authorship entails providing intellectual and creative inputs of the right 'type and amount'[9] in relation to the subject matter at stake, ie authorial contributions. The current copyright law doctrine recognises that, as a matter of fact, abstract and general contributions made outside the process of creation do not count as authorial. Bringing this to a normative level, a refined conception of human authorship should also entail certain specificity of the authorial contributions and their making in a circumscribed process of creation.

This means that authorial contributions ought to be not only of the right kind and amount but also personal and concrete enough to determine the identity of the work. They ought to occur already in the conception of a work and then flow through composition to the materialisation of the final subject matter. Conversely, choosing a motive, a particular technique, a piece of technology, setting up a piece of technology without determining the

9 Lionel Bently and others, *Intellectual Property Law* (5th edn, OUP 2018) 126.

concrete expressive elements the technology will produce or any other activities preceding the process of creation ought not to be qualifying for authorship.

1.2 Amending the Epistemic Approaches

Besides adjusting the interpretation of copyright subsistence and patentability criteria, the authorities should regularly look for the human aspects in the processes of creating and inventing. In certain circumstances, the authorities tend to examine the process, eg when they ask for explanation of originality of choices (France) or identify ideas in the content of the work (Germany) or determine inputs of sufficient transformative character (the UK).

As follows from the present research, authorities' curiosity about the human aspects of creation is usually triggered by a novel or non-conventional type of subject matter or an open dispute about authorship. Such curiosity can hardly be expected to be aroused in the event of them facing an expressive, authorless subject matter which falls within a well-established category (eg a song, a poem) with nobody questioning the authorship.

The proposed amendment to the epistemic approaches—the shift of focus onto the process of creating—would also make the statutory presumptions of authorship and inventorship redundant and require placing the burden of proof of authorship and inventorship on the persons claiming protection. The presumptions that human beings who present works or inventions under their names are their de facto authors or inventors might have fulfilled its purpose in the nineteenth and twentieth century. But they are no longer substantiated in the light of the advancements in AI.

In copyright law the relationship between the author and the work can legitimately be scrutinised under the current concept of original work properly conceived. The handling of *Martin v Kogan II* by the High Court presents a recent and commendable procedure. It allows to account for individual characteristics of the process of creation and follow the

lead of contributions brought up by aspirant authors. The contributions can be followed from the conception of the work through its composition and materialisation. At the same time, this lead of contributions does not detract from the specific legal guidance on what authorship entails given by the Court of Appeal.

Hence, the bit of flexibility lost owing to adoption of the normative approach to authorship could be offset by the flexibilities inherent in the procedure modelled on *Martin v Kogan II*. This procedure would allow the aspirant author to claim those authorial contributions in relation to which they have the best evidence. In the copyright infringement setting, the evidence would have to concern the expressive elements allegedly copied.

Lastly, the *Martin v Kogan II* procedure could be adopted also in jurisdictions without the obligatory first step of subject matter categorisation typical for the UK. *Martin v Kogan II* case shows that the procedure can be run without an initial categorisation of the subject matter. The authorial contribution found on retrial, ie contribution of developing characters, musicality, choice of historical incident and musical terminology, would have virtually the same significance in a novel (a literary work) about an amateur opera singer as in a screenplay (a dramatic work) about the same.

Although the approach of looking at the process of creation (adopted in *Martin v Kogan II* and *Brompton Bicycle*) appears theoretically sound and promising,[10] it is also prone to abuse. At the moment, there seems to be no in-built checks against fabricating the

[10] This approach was identified as relevant for copyright assessment by Professor Leistner: 'From the perspective of copyright, it is not decisive whether the ultimately resulting and to be disseminated result is comparable with human personal intellectual creations, but rather whether its form was given in the underlying creative process [that is] personal, free and creative in the copyright sense.' As translated from the German original: *'Damit kommt es aus urheberrechtlicher Sicht nicht entscheidend darauf an, ob das letztlich resultierende und zu verbreitende Ergebnis mit den persönlich geistigen Schöpfungen von Menschen vergleichbar ist, sondern vielmehr auch darauf, ob der diesem zugr*undeliegende Schöpfungsprozess im urheberrechtlichen Sinne persönlich frei und kreativ gestaltet ist' in Matthias Leistner, 'KI-basierte Werke im Urheberrecht – eine Einordnung'/ 'AI-Based Works in Copyright Law – A Utilitarian Argument against Protection' 9 (*SSRN*, 6 April 2022) <https://ssrn.com/abstract=3987928> accessed 24 October 2022.

story of the process of creation and ex-post implanting author's personality where none has initially been present. Since the questions of what, when and whom the actual process of creation involved, are questions of fact in the competence of national judges,[11] then such checks will need to be found at the national level and will likely stem from general fact-finding practices and examination of evidence. It will be primarily the task of parties' legal representatives to supply enough of reliable (time-stamped) evidence for the judges to construct a coherent story of the process of creation and conclude whether, under such circumstances, the contributions of putative authors were such that the result constitutes author's own intellectual creation reflecting their personality.

If the paradigms are indeed shifted as proposed here, ie the legal presumption of authorship is abandoned and the process of creation becomes subject to proof, copyright owners will have to bear the burden of proof. They will need to think ahead and introduce practices of collecting evidence about the process of creation, its stages and versions of the work for potential litigation. This does not necessarily open a controversial (and so far technically impossible) task of explainability of AI-driven systems (especially neural networks). The judges would not ask why and how an AI-driven system did something. Rather, they would only be interested in seeing what has been done, when and by whom or what. That some artists already monitor and record their creative practices and processes in real-time and in a reasonably cost-effective manner was recently demonstrated in a UK case *Sheeran v Chokri*.[12]

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11 Matthias Leistner, 'Einheitlicher europäischer Werkbegriff auch im Bereich der angewandten Kunst' [2019] GRUR 1114, 1120. To the same effect the CJEU in the *BSA*: 'Consequently, the graphic user interface can, as a work, be protected by copyright if it is its author's own intellectual creation. It is for the national court to ascertain whether that is the case in the dispute before it. When making that assessment, the national court must take account, inter alia, of the specific arrangement or configuration of all the components which form part of the graphic user interface in order to determine which meet the criterion of originality.' Case C-393/09 *Bezpečnostní softwarová asociace v Ministerstvo kultury* [2010] ECR I-13971, EU:C:2010:816 paras 46-48.

12 *Sheeran and others v Chokri and others* [2022] EWHC 827 (Ch) [2022] FSR 15 [54].

There may be valid concerns of copyright invading the space of design law as a result of *Cofemel* and *Brompton Bicycle* in the absence of any preventive measures offered in those cases. To clarify, there is nothing wrong with a subject matter or some of its parts enjoying protection cumulatively by design rights and copyright as long as both forms of protection are properly justified.[13]

But in some cases, copyright could be used opportunistically to extend the protection of a successful design in time. In such cases, copyright owners should be ready to provide evidence as to the process of creation, the nature of human inputs in it and justify how they reflect the personality of their author. For instance, an account of a process of creation of an haute couture garment was given in a fashion magazine Harper's Bazaar. From the conception of the garment and its fixation in a sketch to its elaboration and perfection in the form of the final product, Schiaparelli's designer Daniel Roseberry talks readers through the process, describes and explains his creative choices. One can infer the development of his creative underlying plan from his decisions and actions along the way and hence guess the reflection of his personality in the final product.[14]

On the other side, defendants may try to challenge the nature of those elements that were claimed to constitute author's intellectual creation. They could counter-argue and bring evidence as to which elements are typically developed on the basis of research into consumers' preferences, marketability, their suitability for mass production or other utilitarian reasons and hence outside author's creative freedom (in more detail above in Chapter VI.).

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13 'A design protected by a design right registered in or in respect of a Member State in accordance with this Directive shall also be eligible for protection under the law of copyright of that State as from the date on which the design was created or fixed in any form.' Directive 98/71/EC of 13 October 1998 on the legal protection of designs [1998] OJ L 289/28, art 17.

14 Rachel Tashjian, 'How a Schiaparelli Couture Look Gets Made' (*Harper's Bazaar*, 4 October 2022) <https://www.harpersbazaar.com/fashion/designers/a41443815/schiaparelli-couture-process/> accessed 23 October 2022.

As a result, copyright protection of a design may thus be reduced to a negligible number of elements and have a slim scope only.[15] This should enable a free reproduction of elements which once used to be novel and distinctive (of that product from other products)[16] but not elements which reflect author's free, creative and personal choices. This inevitably granular approach is envisaged already in *Infopaq*: reproduction of a work in part takes places if that reproduced part 'contains an element of the work which, as such, expresses the author's own intellectual creation; it is for the national court to make this determination.'[17]

In contrast with copyright law, in the current patent grant procedure, the authorities have only limited powers to access and request information about the process of inventing. Therefore, this thesis proposes a reform that builds on the implicit requirement for human inventorship. To enable patentability assessment reflecting human inventorship requirement, patent offices, courts and the public should obtain information as to whether any AI-driven system[18] was involved in the process of inventing and if so, what was its role in the process.

Correspondingly, applicants' disclosure duties should be extended. They ought to disclose if, and to what extent, an AI-driven system was used and describe the steps in the process which were undertaken by it. More specifically, applicants would be required to

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15 This is the result achieved by the German Supreme Court in *Geburtstagszug*, Decision of 13 November 2013, I ZR 143/12 [2014] GRUR 175 with which this thesis agrees. The conditions of copyright protection have been determined at the EU level, so the only room for maneuver for national judges is to be creative with facts and evidence and curb the scope of protection on the basis of their factual findings if and when they find an attempt of unjustified extension of protection.

16 Regulation (EC) 6/2002 of 12 December 2001 on Community designs [2001] OJ L 3/1, art 4 (1) and rec 19.

17 Case C-5/08 *Infopaq International A/S v Danske Dagblades Forening* [2009] ECR I-6569, EU:C:2009:465, para 48.

18 An AI-driven system could be defined as a system that can perform tasks such as decision-making, problem-solving, etc which normally require human intellectual activity. This proposal stems from definitions of AI offered in Stuart Russell and Peter Norvig, *Artificial intelligence: a modern approach* (3rd global edn, Pearson 2016) 1–2.

disclose the nature of the AI-driven system, a basic specification of the training dataset and functions of the algorithms, describe the system's basic workings and the role it played in the process of devising the invention, namely which steps in the process were undertaken by the system and their results.

The information provided under this extended disclosure duty should be clear and sufficiently complete to assess, on a case-by-case basis, whether the inventive technical features of the claimed subject matter were due to a human creative intervention and human intellectual activity. For instance, if the invention is found non-obvious, it should also be possible to ascertain whether the non-obviousness is not due to the steps undertaken by the AI-driven system (which may be superior to the state-of-the-art AI-driven systems).

In the EPC system, such a disclosure could be part of the description of the technical problem and solution according to Rule 42 of the Implementing Regulations.[19] At the moment, Rule 42 specifies that the description in the patent application should contain, inter alia, such a description of the invention that 'the technical problem, even if not expressly stated as such, and its solution can be understood'.[20]

According to the EPO's Guidelines for Examination, the purpose of the Rule 42 (in concert with Article 83 of the EPC) is 'to enable a skilled person to put the invention as claimed into practice; and […] to understand the contribution to the art which the invention as claimed has made.'[21] It seems logical that another, perhaps even more immediate, purpose of the current disclosure duty is to enable the EPO to understand the invention in order to examine its patentability. The extended disclosure duty would add to the EPO's

19 Implementing Regulations to the EPC. See also European Patent Office, *Guidelines for Examination* (EPO 2021) Part F, Chapter II [4].

20 Implementing Regulations to the EPC, Rule 42(1)c).

21 European Patent Office (n 19) [4.1].

understanding of the invention, including the fact whether the subject matter constitutes an invention at all and whether it involves an inventive step.

Whenever an applicant would fail to declare and sufficiently explain the steps undertaken by an AI-driven system and their significance for the invention, the EPO would give them a chance to rectify the declaration. If it is not amended, then it may eventually refuse the application under Article 90 of the EPC for not complying with the formal requirements of patentability. In cases where an applicant would provide a prima facie complete and coherent declaration, the ensuing question is how to verify its contents.

An ex-ante verification of the information by the EPO will likely be constrained due to the lack of finances and competence. As Professor Lemley argues in his essay, it is unlikely that extending the examination time by a patent office would bring any significant fruits in terms of increased quality of patents.[22] On top of that, verifying statements as to what happened behind the closed doors of applicants' laboratories and research departments would seem especially onerous given the EPO's lack of investigative powers, eg to enter and search premises.

However, this lack of EPO's competence and powers may be compensated for by intensifying the incentives to disclose the truth on the side of those involved in drafting patent applications. At the end of the day, either the patent applicant or the designated inventor or inventors will be natural persons. Therefore, the EPO form 1001 Request for grant of a European patent and the form 1002 Designation of inventor should be amended so that they contain a safeguard against false statements and misrepresentation made by

[22] Lemley argues that 'money spent improving the PTO examination practices will largely be wasted on examining the ninety-five percent of patents that will either never be used, or will be used in circumstances that don't crucially rely on the determination of validity.' Mark Lemley, 'Rational ignorance at the patent office' (2001) 95 Northwestern University Law Review 1495, 1511. It is curious, however, how he arrived at the exact number of 95% in his final argument when his preceding statements about the numbers of licensed and litigated patents (and the reasons why litigated or not litigated) which should substantiate this final argument are acknowledged to be mere guesses and speculations.

natural persons. Any attempts of natural persons deliberately and falsely declaring themselves as inventors instead of acknowledging an absence of a human inventor should be discouraged.

An inspiration may be taken from the USPTO form in which inventors pledge: 'I hereby acknowledge that any willful false statement made in this declaration is punishable […].'[23] Curiously enough, the above-mentioned EPO forms in their current versions do not contain any pledges to similar effect. But, at the same time, a disclosure of false information (when under a legal duty to disclose) or acting under false pretenses with the intent to unjustifiably enrich oneself is a recognised criminal offence in Europe.[24]

Some of the incentives to produce a truthful declaration could be allocated to legal representatives of patent applicants too. The legal representatives should be required to make a person willing to declare themselves as the inventor aware of the possible legal consequences of false declaration and to provide a *vidimus* attestation of that person's signature on the declaration. The pledge and the ensuing risk of prosecution and punishment should be the main measure to disincentivise dishonesty. The risk of potential reputational repercussions on the side of the legal representatives should just back the main measure.

Any potential fraudulent attribution of inventorship would likely be discovered only as a consequence of ex-post verification of the information disclosed. To ensure a wide scrutiny of involvement of human inventorship, competitors, downstream innovators and the public in general should be able to challenge the accuracy of the disclosure. This could be done either through opposition under Article 99 of the EPC whereby any person may

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[23] USPTO, 'Declaration (37 CFR 1.63) For Utility Or Design Application Using An Application Data Sheet (37 CFR 1.76)' (*uspto*, no date available) <https://www.uspto.gov/patents/apply/forms> accessed 14 November 2022.

[24] From the jurisdictions covered in this thesis: in the UK see Fraud Act 2006, s 3, in Germany and France see the penal codes *Strafgesetzbuch* of 13 November 1998 (BGBl. I S. 3322) as amended, § 263 *Betrug*, *Code pénal*, Art 313-1.

give notice to the EPO of opposition or revocation under Article 138(1)(a) of the EPC before national authorities, both on the ground that the subject matter is not patentable. Invalidity for lack of patentability either for lack of invention or lack of inventive step can be argued as a defence in infringement lawsuits too.[25]

The challenge to patentability for lack of human inventorship (under lack of inventive step as the explicit requirement) could be substantiated by demonstrating that the disclosed AI-driven system was used in a way in which any person skilled in the art would have used such a system, ie the use of an AI-driven system corresponding to the description as well as its use for those steps would have been obvious. Alternatively, the challenge (for lack of invention) could be substantiated by demonstrating that the inventive technical features owed their existence to the steps undertaken by the AI-driven system and not to human creative intervention.

The most precarious case would be to substantiate the challenge to patentability in case no use of an AI-driven system is acknowledged in the description. Then the challenging party could only rely on circumstantial evidence of the increased patentee's patenting activity (of the same type of invention) and the speed with which the patentee has been generating new inventions provided such performance could not be explained in any other way, eg years of research or acquisitions. Taking the example of the antibiotic *halicin* from Chapter II., the AI-driven system used to discover *halicin* is likely to identify new antibiotics and thus likely to generate new medical uses for known compounds extremely quickly compared with human researchers. The involvement of an AI-driven system in the inventive process can therefore be discernible from the rush to patent. If, on the balance of probabilities, the court finds that the disclosure duties were not dutifully met, the process

[25] Patents Act 1977, s 74, German Patent Act, § 81 (though there are specifics given to the German bifurcated patent litigation system) and French Intellectual Property Code, Art L613-25.

of devising the invention would become subject of fact finding before the court with the burden of proof being placed on patentees.

This thesis acknowledges the limitations of the above-outlined suggestions to solve the disclosure problem. But the hope is that they could at least start the discussion about what is feasible and what could be effectively improved within the European patent system. As the pertinent questions around the involvement of AI-driven systems largely depend on a case-by-case technical analysis, it would be helpful to consult experts from various technical fields as to the questions which technical aspects may be the most telling, how to distribute the burden of proof, how to maintain some reasonable level-playing field and share responsibility for preserving patents for human intellectual creations.

In practical terms, the described parts of the proposed reform could be easily implemented. It would require an extension of the existing disclosure duty (in the description of the technical problem and solution under Rule 42) with a view to equipping examiners with more relevant information.[26] In addition, the amendment of the text of the relevant EPO forms would be necessary to insert inventor's pledge and a requirement for legal attestation of signatures. The reform would not be in conflict with the EPC Contracting States' commitments in the realm of patent law because it does not introduce any new patentability condition, nor impedes the grant of patents procedurally.[27]

Admittedly, the proposal of extended disclosure duty goes against intuitions of many patent lawyers. The objections raised may be along the lines that the process of inventing is irrelevant and should not be subject to scrutiny. These objections are usually supported

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[26] This is inspired by arguments were made by Professor Sherman in relation to disclosure of biological resources and indigenous knowledge with a view to learning their role in scientific and technical developments: Brad Sherman, 'Regulating Access and Use of Genetic Resources: Intellectual Property Law and Biodiscovery' (2003) 25 EIPR 301, 307–08.

[27] By analogy Nuno de Carvalho, 'Requiring Disclosure of the Origin of Genetic resources and Prior Informed Consent in Patent Applications Without Infringing the TRIPS Agreement: The Problem and the Solution' [2000] Wash U J L & Pol'Y 371, 372 and 382.

by reference to historical sources. For instance, Terrell on the Law of Patents 1965 refers to *Liardet v Johnson* when stating that '[p]atents have been held valid for inventions that have been the result of the merest accident'.[28]

Contrary to what one may infer from the Terrell on the Law of Patents 1965, the patent at stake in *Liardet v Johnson* did not involve an invention by accident and neither party claimed it did. Rather, Lord Mansfield used the word 'accident' when explaining the rationale for patent system to the jury and the 'accident' did not relate to any real invention. Lord Mansfield in *Liardet v Johnson* as reproduced in an article of 1902:

> So in the play of the Alchymist, when Sir Epicure Mammon was looking for the philosopher's stone he found out a cure for the itch. Thus, if they don't get what they are looking after, they find something else, and some of the greatest inventions we know of have been hit upon by accident.[29]

After reading the passage in its context, it becomes clear that Lord Mansfield only tries to shield any inventors, in general, from being questioned whether they had worked hard enough to merit a patent for their inventions.

There is seemingly some basis for these objections in the US Patent Act, § 103 stating that '[p]atentability shall not be negated by the manner in which the invention was made'.[30] However, even this provision states that the invention must be 'made'. To be made under the US patent law means to amount to 'a product of human ingenuity'[31] (Chapter III.). In the context of the US DABUS patent applications, a US District court affirmed that

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28 Guy Aldous, Douglas Falconer and William Aldous, *Terrell on the Law of Patents* (11th edn, Sweet & Maxwell 1965) 120, no longer included in the newest edition.

29 Wyndham Hulme, 'On the History of Patent Law in the Seventeenth and Eighteenth Centuries' (1902) 18 L Q Rev 280, 285 reproducing *Liardet v Johnson* as reported in *Morning Post* of 23 February 1778 (No 16667, p 2, col 4).

30 35 US Code, § 103.

31 *Association for Molecular Pathology (AMP) v Myriad Genetics Inc*, 133 S Ct 2107 (2013) 2116, 2217.

inventors are those individuals who conceive of the invention.[32] In the view presented here, the correct reading of § 103 is that as long as an invention has been conceived and made by a human being, it does not matter in which way it was conceived and made.

As explained in Chapter III., a mere serendipitous event of finding a substance or observing a phenomenon does not amount to an invention in the sense of the EPC and *Tomatoes/State of Israel*.[33] The EPC invention requires at least such understanding that it allows to teach others how to repeat the process or re-create the invention or (if already known then) how to use it to achieve the novel and inventive technical effects.

Hence, the disregard for the process of inventing is relevant only to the extent to which it protects inventors from being deprived of patents just because a lucky or serendipitous event occurred in the process of them making the invention. Employment of an AI-driven system in the process of inventing is hardly analogous to a lucky or serendipitous event though.

Lastly, it may plausibly be questioned whether the extended disclosure duty would not create disproportionate costs or be otherwise too cumbersome to patent applicants. In effect, the additional costs associated with meeting the obligation should be, at least in case of employees' inventions, fairly limited to the technical description of the AI-driven system. This is because many national legal regimes already provide for collection, storage and processing of the relevant information concerning the process of devising inventions.

Some countries, including the UK, Germany and France, legislate for appropriation of employees' inventions in favour of their employers and for compensatory schemes

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32 US District Court for the Eastern District of Virginia Thaler v Hirschfeld 1:20-cv-903 (LMB/TCB) (ED Va Sep 2, 2021) referring to the Federal Circuit in Max-Planck 734 F3d at 1323.

33 *Tomatoes/State of Israel* (n 5).

mainly based on labour law principles.[34] Though at first glance these norms concern relationship between an employee and their employer,[35] modern employees' inventions regulations seem to have been justified by intellectual property reasons too.

As Professor Phillips observes, the regulations make sense for ex-post creation and pragmatic reasons that '[i]rrespective of any moral legal argument as to which of employer or employee holds the better right to an invention, it is in general the employer who is the better equipped to exploit it.'[36] He adds that most countries (except for the US) 'feel at least some need to protect the employee inventor's inherent property right in his inventions'.[37] And since no one 'should be deprived of property without compensation, then some measure of compensation should be forthcoming.'[38]

Similarly, as Professor Ann reports, in German scholarship, there is a tension between a principle of labour law stating that the fruits of employee's labour belong to the employer and an inventorship principle.[39] According to Reute, the prevailing approach to the employees' inventions regulation in the German academic literature is guided by a 'monopoly principle' derived from intellectual property justifications, but many of its

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34 Jan Jonczyk, 'Employee Inventions' [1989] IIC 847. The report is based on national reports received from 24 countries.

35 Under the UK common law, the determination of to whom an employee's invention belonged used to be decided on the basis of employment law, having roots in an ancient master-servant relationship. Stephen Saxby, 'Employees' inventions and English law' in Jeremy Phillips (ed) *Employees' Inventions. A comparative study* (Fernsway Publications 1981) 109. Professor Cornish regards employees' inventions regulation still, even under the provisions of the Patents Act 1977, as a matter for labour law. William Cornish 'Rights in Employees' Inventions: The United Kingdom Position' (1990) 21 IIC 298, 305.

36 Jeremy Phillips, 'Employees' inventions: an analysis of the nature of the subject' in Jeremy Phillips (ed) *Employees' Inventions. A comparative study* (Fernsway Publications 1981) 15.

37 ibid 25.

38 ibid 26.

39 Christopher Ann, '§ 21. Arbeitnehmererfindungen' in Christopher Ann (ed) *Patentrecht* (8th edn, CH Beck 2022) [4].

aspects are governed by a compensatory principle whereby the compensation is understood to compensate for the extra effort of the employee ('extra performance principle').[40]

In France, a compensation scheme for employees-inventors was introduced by a Decree of 4 September 1979.[41] However, employees whose main mission under their contract of employment was to invent for their employer did not have any compensatory claim against their employer until a reform brought by a statute of 26 November 1990 which 'aimed at encouraging research by employees.'[42] This rationale suggests that such compensation schemes may have not only compensatory, but also inducive effects on inventive activity of employees.[43] Therefore, the regulation of employees' inventions seem to be justifiably based on both, labour law and intellectual property principles.

Regardless of their nature, from a practical viewpoint, functioning of the UK, French and German regulations require knowledge of the process by which an employee's invention was devised. More specifically, pursuant to the Patents Act 1977, to determine the amount of compensation for the employee, it must be considered, among other things,

> (b)the effort and skill which the employee has devoted to making the invention;
> (c)the effort and skill which any other person has devoted to making the invention jointly with the employee concerned, and the advice and other assistance contributed by any other employee who is not a joint inventor of the invention; and
> (d)the contribution made by the employer to the making, developing and working of the invention by the provision of advice, facilities and other assistance, by the provision of opportunities and by his managerial and commercial skill and activities.[44]

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40 Matthias Reute, 'The German employee-invention law: an outline' in Jeremy Phillips (ed) *Employees' Inventions. A comparative study* (Fernsway Publications 1981) 193-94.

41 Christian Le Stanc, 'The new French law on employees' inventions' in Jeremy Phillips (ed) *Employees' Inventions. A comparative study* (Fernsway Publications 1981) 43.

42 Fréderic Pollaud-Dulian, *La propriété industrielle* (2nd edn, ECONOMICA 2011) [374].

43 This is also supported by research conducted by and reported in Dietmar Harhoff and Karin Hoisl, 'Institutionalized incentives for ingenuity—Patent value and the German Employees' Inventions Act' (2007) 36 Research Policy 1143, 1149-50.

44 Patents Act 1977, s 41(4). Similarly ibid s 41(5) in respect of an invention which originally belonged to the employee.

In the AI context, employees' contributions would range from providing advice, assistance (ie activities outside inventorship) to producing the inventive concept (ie activity meriting inventorship). Employer's contribution may be in the form of providing an AI-driven system which may support the inventive activity of employees or replace it. Given the focus of the statute on individual contributions, it is in the best interest of employees-inventors in the UK to have already developed practices to gather the relevant information about the process of devising inventions, including who and when contributed what to the invention. The UK employers, when acting as patent applicants in respect of their employees' inventions, would only need to collect the information from their employees.

German and French regulations even provide explicitly for a duty of employees to report inventions to their employers, including the details of the process of their devising and individual inventor's contributions to inventions. In France, an employee is obliged to report the subject matter of the invention, its anticipated applications and circumstances under which the invention was made.[45] In Germany, a notification must contain description of the technical problem, the solution and the inventive process, including inventor's own contribution to the invention.[46] Therefore, German as well as French employers, when acting as patent applicants in relation to their employees' inventions, are already equipped with the necessary information to meet the herein proposed extended disclosure duty.

There may be a temptation to overstate contributions by employees or to list themselves among inventors by executive. However, according to recent research by Professor Harhoff and Hoisl, the latter does not happen as often as it might have been

[45] French Intellectual Property Code, art L 611-7, 3 in conjunction with ibid arts R611-1 and R611-2, partie réglementaire.

[46] Gesetz über Arbeitnehmererfindungen of 25 July 1957 (BGBl I S 756) as amended. Reute (n 40) 189.

expected.[47] Additionally, the proposed amendment of the EPO forms and the requirement to honestly pledge inventorship under the threat of prosecution should discourage such practices. If the EPO forms were amended accordingly, the policing against overstatement of contributions could be secured by disgruntled employees and colleagues.

Finally, the authorities should make a better use of the information already available to them. In particular, they should return to the basics of the step-by-step examination of what a person skilled in the art would have done, similarly to the UK Supreme court's practice in *Actavis v ICOS*.[48] In addition, they should take into account only technical considerations leading the hypothetical steps of a person skilled in the art and disregard any steps informed by commercial considerations or considerations based on confidence (Chapter VI.).

To conclude, if the conceptions of works and inventions as human intellectual creations are to be maintained and have some real-life impact on the application practice, the above proposed changes should be adopted. If authorities do not change their epistemic approaches swiftly, there is a risk that the legitimacy of copyright and patent systems is eroded by protecting human intellectual creations next to (soon-to-be-quickly proliferated) expressive and technical subject matter without human creators. The reasons for preservation of human intellectual creations in the centre of copyright and patent laws are outlined in section 3 below.

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47 To quote: 'Superiors are mentioned as a co-inventor, not due to their inventive performance or participation in the inventive process, but due to their position within the firm. Given the notoriety that this phenomenon has received in the literature, our results suggest that its importance may have been overstated considerably.' Harhoff and Hoisl (n 43) 1158.

48 *Actavis Group PTC EHF v ICOS Corporation* [2019] UKSC 15, [2019] Bus LR 1318.

2 CONTRIBUTIONS TO THE AI AND IP DEBATE

The present research also hopes to inform the AI and IP debate to some extent. The issue (i), ie whether current law recognises an AI-driven system as an inventor or an author (and hence whether an AI-driven system can be named as the inventor in a patent application or designated as an author in the copyright context) has already been raised before authorities. In the light of the decisions analysed in Chapter II., these issues may be considered resolved or almost resolved by the European Patent Office and authorities in the UK and the US. Hopefully Australia will join them after the appeal to the High Court of Australia.[49]

The present research corroborates the conclusion that only a natural person can be named as inventor, passed as author or otherwise recognised as the creator. Foremost, this conclusion is faithful to the likely intention of the drafters of the Berne Convention, the Paris Convention and the European Patent Convention 2000. At the time of their drafting, the authors and inventors were generally understood to be human beings and works and inventions to amount to human intellectual creations. Though there are deviations from this principle for the sake of more effective exploitation of the rights, eg work for hire doctrine, encyclopaedias or film producers, these do not invalidate the general principle.

The issue (ii), ie whether an AI-driven system can (in fact) devise an invention or create a work of literature or art has not been discussed in much of detail before the authorities to date. In this wording, the question can legitimately be answered yes and no. The answer would depend on how the activities of devising or creating are conceived of.

First, according to the level of abstraction of the inputs and the breadth of the process of creation as currently understood, the correct answer is yes. A no answer would require us to imagine inventing or creating as having the appropriate motivation, embarking on the

[49] The law known by the closure of writing.

process of creation or invention or defining its ultimate purpose. However, this is not how the current law in the selected European jurisdictions conceives of the relevant process and relevant intellectual inputs. There is no basis for regarding a person who states the objective, gives general ideas or initiates the process of inventing or creation as the actual inventor or author. Rather, the factual activity of inventing corresponds to solving a narrowly specified technical problem and the activity of creating to choosing expressive elements. There is evidence that there are AI-driven systems capable of inventing and creating in such a narrow and factual sense.

Second, upon taking a holistic view of the copyright law and patent law as done in this thesis, the activities of devising inventions and creating works become viewed as purely human intellectual creative activities. Hence the correct answer is no. This is especially so because of the human nature of authors and inventors and human aspects of copyright subsistence and patentability criteria. In this sense, AI-driven systems cannot invent or create because they are not human beings. Yet, AI-driven systems can determine expressive and inventive technical features of a subject matter without inventing or creating in the legal sense. Put differently, if a human being determines expressive or inventive technical features of a subject matter, this activity produces legal effects. Whereas if the same is done by an AI-driven system, no legal effects ensue. Hence, not every (convincingly) expressive or inventive technical subject matter can automatically be considered a human intellectual creation.

Third, to a slightly tweaked question: whether an individual AI-driven system has (de facto) devised or created a particular subject matter, the methodologically correct answer is that it depends on the facts. Though this sounds rather straightforward, the legal sense and the factual sense of inventing and creating sometimes get muddled. For instance, some argue that because authorship and inventorship require conception then every expressive or

technical subject matter must be accompanied by a human author or inventor. One must only look for them diligently.

For instance, Professor Shemtov in his study on inventorship concludes that

> under French law an inventor is a person who is actively involved in the conception of the invention […], by definition, every invention has a conception phase and that conception is at present, as well as in the foreseeable future, limited to human faculties, notwithstanding the involvement of a sophisticated AI system featuring an unpredictability element. This being so, it follows that every invention may have been conceived by at least one human actor; it is this actor who is likely to be the inventor under French law.[50]

The above reasoning illustrates the confusion of legal inventing and factual inventing. It essentially says that since every invention must *de lege lata* have a conception phase and this phase is *de lege lata* limited to human faculties, then necessarily every invention has (and for the foreseeable future will have) a *de facto* human inventor. This only reinforces the long-held factual assumption that an inventive technical solution can only come from a human being.

In the view presented here, no doubt that there will always be persons intellectually involved in the processes of production of technical solutions or expressive subject matter. However, that does not necessarily mean that these persons will contribute to their conception in the capacity of inventors, ie by bringing about the feature that implies an inventive activity, or authors, ie by determining the expressive elements.

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[50] Noam Shemtov, 'A Study on Inventorship in Inventions Involving AI Activity' (*EPO* February 2019) 18-19 <http://documents.epo.org/projects/babylon/eponet.nsf/0/3918F57B010A3540C125841900280653/$File/Concept_of_Inventorship_in_Inventions_involving_AI_Activity_en.pdf> accessed 17 December 2021.

3 CONTRIBUTIONS TO THE NORMATIVE ISSUE

The issue (iii), ie whether any changes to law should be introduced in order to accommodate human-AI productions is currently trending in the AI and IP debate. Building on the present research and thus recognising the central place that human intellectual creations occupy in the modern copyright and patent laws, it is argued that subject matter without human creators should not be accommodated by those laws. First, there are good historical reasons for maintaining the status quo. Second, human intellectual creations carry an intrinsic and social value which the other subject matter do not. Since the reasons for keeping the copyright and patent protection limited to human intellectual creations have been left largely unattended to in the AI and IP debate,[51] this section aims to remedy that.

As demonstrated in Chapters III. and V., origination in human intellectual creative activity matters for eligibility for copyright and patent protection. This has been the gold standard roughly since the eighteenth century.[52] The historical sources cited below affirm and explain the unique situation of human intellectual creative activity and human intellectual creations in copyright and patent laws. They also emphasise that the human intellectual creative activity is the raison d'être for intellectual property, and they do not suggest that this could be compromised or extended to any other activity by analogy.

This section further outlines the intrinsic value and the social added value of human intellectual creations. The justificatory theories building on these values coincide in time with negotiating and drafting of the Berne Convention and the Paris Convention. Hence it

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51 One notable exception being Matthias Leistner, 'KI-basierte Werke im Urheberrecht – eine Einordnung'/ 'AI-Based Works in Copyright Law – A Utilitarian Argument against Protection' 9 (*SSRN*, 6 April 2022) <https://ssrn.com/abstract=3987928> accessed 24 October 2022.

52 Brad Sherman and Lionel Bently, *The Making of Modern Intellectual Property Law: The British Experience, 1760-1911* (CUP 1999) 173. The emergence of copyright and author's rights systems is dated back to the eighteenth century also in Silke von Lewinski, *International Copyright Law and Policy* (OUP 2008) 35, 37.

is plausible and likely that these theories influenced and co-constructed the underlying ideological framework of these treaties, including human authorship and human inventorship.

This is followed by justifications of copyright and patents focusing solely on the value derived from the literary or artistic expressivity or technical utility of a subject matter, ie utilitarian or instrumentalist value. These accounts are more modern and were largely formulated in reaction to criticism of already existing copyright and patent systems. This means that these accounts can explain the existence of some, more modern requirements for protection, eg the specification requirement. But these accounts have never operated as a self-standing justification for granting patents or copyright subsistence.

Therefore, the rest of this section argues, in a fairly limited space, that copyright and patents should remain reserved for human intellectual creations because of their special values. Even if some accounts may provide attractive reasons for protection of expressive or technical subject matter regardless of their origin, these accounts do not offer sufficient justification for property in those subject matter.

3.1 Role of Human Intellectual Creative Activity in Historical Sources and Nowadays

Human intellectual creations currently enjoy a robust, generous and (ever) expanding protection which is justified mainly by virtue of the human intellectual creative activity being poured into their immediate creation.[53] Human creators did not find themselves at the

[53] To name only a few examples of this tendency: the CJEU repeatedly instructed that the (copy/author's) rights should be given broad interpretation (Case C-160/15 *GS Media BV v Sanoma Media Netherlands BV and Others* [2016] EU:C:2016:644 para 30) and exceptions to rights must be interpreted strictly (Case C-201/13 *Johan Deckmyn and Vrijheidsfonds VZW v Helena Vandersteen* [2014] EU:C:2014:2132 para 22); a disbalance in the three-step test Christophe Geiger, Jonathan Griffiths and Reto Hilty, 'Towards a Balanced Interpretation of the "Three Step Test" in Copyright Law' (2008) 30

heart of copyright and patent laws by accident. They had to establish themselves as authors and inventors and defend their positions against guilds, intermediaries and free riders.

Instead of a detailed map, this section offers a bird's-eye view of the milestones documenting the role of human intellectual creative activity throughout the history of copyright and patent law. The selected sources nonetheless testify to two realities. First, the human creativity underpinnings have always been there, despite not being always popular. Second, considerations based on human intellectual creative activity were of paramount importance to questions as to whether works and inventions should be protected at all and if so under which entry conditions.

Patents as proprietary rights in intangible objects 'emerged from the very tangible world of artisanship and crafts'[54] and hence the first inventors were artisans and craftsmen. The first patent statute which was enacted in Venice derived inventor's rights from 'the very fact of his invention'[55] rather than from a privilege granted by a state. Individual rebellions against Renaissance guilds underscored the role of individual inventors and their ingenuity, eg a patent for the architect Brunelleschi was justified by 'his own ingenuity and invention'.[56]

In Elizabethan England patents also served to attract import of new technology through welcoming their carriers and embodiments, ie foreign craftsmen, and artisans.[57] Following a public resentment against royal prerogatives, the Statute of Monopolies 1623

EIPR 489; extension of duration of copyright; generous doctrine of equivalents not only in Germany but now in the UK too *Actavis UK Ltd v Eli Lilly & Co* [2017] UKSC 48, [2017] Bus LR 1731.

54 Joanna Kostylo, 'Commentary on the Venetian Statute on Industrial Brevets (1474)' in Lionel Bently and Martin Kretschmer (eds), *Primary Sources on Copyright (1450-1900)* (2008) <www.copyrighthistory.org> accessed 20 April 2021.

55 ibid.

56 Pamela Long, 'Invention, Authorship, "Intellectual Property" and the Origin of patents: Notes toward a Conceptual History' (1991) 32 Technology and Culture 846, 881.

57 Christine MacLeod, *Inventing the Industrial Revolution* (CUP 2009) 11.

prohibited them with few exceptions, including patents for 'the true and first inventor'.[58] In *Edgeberry v Stephens* this provision was interpreted as encouraging inflow of inventions 'whether learned and acquired by study or travel'.[59]

After another wave of resentment, the patents were saved by the social contract theory according to which the consideration for a patent was a sufficient disclosure of the invention. The requirement of disclosure emerged in the UK case law in the final decades of the eighteenth century.[60] Yet, even after the social contract model established itself as the dominant justification of patents in the UK, inventors' labours and heroic endeavours leading to invention were granted a special recognition and rewards by the Parliament.[61]

The statutory term of true and first inventor was abandoned in favour of the actual deviser of the invention on the recommendation of the Banks Committee reporting on fitness of the British patent system in 1970.[62] This development was also found noteworthy by Justice Birss in his reasoning for the Court of Appeal re the UK DABUS patent applications.[63] The inventor-actual deviser became a legal requirement by virtue of enactment of the Patents Act 1977[64] and hence the activity of devising inventions became the only activity which merited a patent.

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58 Statute of Monopolies 1623. As quoted in Kostylo (n 54).

59 *Edgeberry v Stephens* (1693, 1738) 90 ER 1162.

60 Lionel Bently, 'Patents and Trade Secrets in England: The Case of Newbery v. James (1817)' in Rochelle Dreyfuss and Jane Ginsburg (eds), *Intellectual Property at the Edge: The Contested Contours of IP* (Cambridge 2014) 312–13.

61 Robert Burrell and Catherine Kelly, 'Parliamentary Rewards and the Revolution of the Patent System' [2015] CLJ 423, 439–41.

62 Maurice Banks, *The British Patent System* (Her Majesty's Stationery Office 1970) Cmnd 4407.

63 *Stephen Thaler v Comptroller General of Patents Trade Marks and Designs* [2021] EWCA Civ 1374, [2021] 9 WLUK 172 [42]-[47].

64 ibid.

In France, the 1843 Parliamentary reports accompanying a patent law reform suggested abandoning patents for improvements and patents for importation. The reasons were that the activities leading to improved or imported inventions were not seen as the right human intellectual creative activity to merit patents. Patents for improvements prompted inventors to share even premature conceptions which were then picked up by 'certain industrial speculators, the true hornets of the inventive genius […] paralysing their development'[65] and often also their exploitation to the detriment of their inventors.[66] Patents for imported inventions were regarded by contemporaries as a mere 'prize in the race' and hence as a 'theft' from the public domain.[67]

According to French Professor Roubier writing in the mid-twentieth century, the rights for inventors are given out for bringing 'a truly new good to the society, a product or a process, through their thinking and their work'.[68] Robinson, a US commentator of the end of nineteenth century, defined inventions as products of two distinct, though intertwined, human activities: intellectual and creative. In his view, patent eligible inventions must involve

> (1) An idea conceived by the inventor; (2) An application of that idea to the production of a practical result. Neither of these elements is alone sufficient. An unapplied idea is not an invention. The application of an idea, not original with the person who applies it, is not an invention. Hence, the inventive act in reality consists of two acts; one mental, the conception of an idea; the other manual, the reduction of that idea to practice.[69]

And finally, in united Germany, the history of statutory patent law began with the Patents Act 1876. In 1923 the German Imperial Court found that 'a mere objective enrichment of

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65 Adrien Huard and Michel Pelletier, *Répertoire de législation et de jurisprudence en matière de brevets d'invention* (Librairie générale de jurisprudence 1885) 28.

66 ibid.

67 ibid 29.

68 Paul Roubier, *Le droit de la propriété industrielle* vol 1 (Recueil Sirey 1952) 16.

69 William Robinson, *Law of Patents for Useful Inventions* (Little, Brown 1890) 77.

technology does not suffice; the invention must rest on a creative intellectual activity not lying close [being obvious] to an average-skilled man.'[70] The Patents Act of 1936 allegedly makes 'the creative act of the inventor [...] a condition for patent protection.'[71] In that period, many references to 'creative act' or 'creative intellectual activity' were made in the decisions of the German Imperial Court.[72]

Since the Statute of Anne 1710, in common law countries copyright was thought of as an instrument to encourage authors to create literary works and thus advance learning.[73] With this statute, the role of authors in production of literary works took precedence over the role of books' disseminators. The 'Parliament focused upon the social contribution the author could make in the encouragement and advancement of learning'.[74] The Act explicitly stated that copyright should encourage 'Learned Men to Compose and Write useful Books'[75] and hence indicated the meritorious intellectual activity: composing and writing. Though in reality the creation of books required printing and printing was obviously a necessary arrangement for existence of books, this was not the activity to be rewarded or stimulated by copyright.

Professors Sherman and Bently in their book The Making of Modern Intellectual Property Law describe the journey of copyright law and patent law from their human creativity underpinnings to the current focus on subject matter. According to their research,

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70 Friedrich-Karl Beier, 'Zur historischen Entwicklung des Erfordernisses der Erfindungshöhe' [1985] GRUR 606, 615. Professor Beier was a director of the Max Planck Institute for Foreign and International Patent, Author's Rights and Competition Law, Munich.

71 ibid 616 referring to an article by Lindenmaier published in GRUR in 1939.

72 ibid 616.

73 Peter Drahos, *A Philosophy of Intellectual Property* (ANU Press 1996) 31.

74 Ronan Deazley, 'Commentary on the *Statute of Anne* 1710' (2008) in Lionel Bently and Martin Kretschmer *(eds), Primary Sources on Copyright (1450-1900)* <www.copyrighthistory.org> accessed 20 April 2021.

75 ibid.

mental labour and the process of creativity were the main concern of intellectual property law in the eighteenth and the first half of the nineteenth century.[76] They claim human mental labour to be 'the most influential organising principle of pre-modern intellectual property law.'[77]

According to their findings, the tide changed towards the end of the nineteenth century when the 'law had shifted its attention away from mental labour and creativity to concentrate more upon the object itself.'[78] They identify a reason for this shift—an irritating practice of authorities to pass arbitrary judgments about the quality of inventions or works and a consequent effort to avoid that practice.[79] As they argue, this prompted initiatives to stabilise and enclose the subject matter.[80] 'The problem with this, however, was that labour and creation were not readily susceptible to quantification.'[81]

Consequently, the human creativity underpinnings surrendered to the increased pressures of categorisation, formalisation and registration. Yet, as Sherman and Bently conclude, in modern law 'creativity reappeared in the form of the requirements of originality and non-obviousness, in which applicants had to show, in effect, that their respective works were creative.'[82]

In copyright law, the human creativity underpinnings enjoyed a revival in the last decades. According to the US Supreme Court, copyright subsists only in works which are 'original and are founded in the creative powers of the mind [and are …] the fruits of

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76 Brad Sherman and Lionel Bently, *The Making of Modern Intellectual Property Law* (CUP 1999) 173.

77 ibid.

78 ibid.

79 ibid 177–80.

80 ibid 180.

81 ibid.

82 ibid 200.

intellectual labor'.[83] For the High Court of Australia, creativity is one of the 'aspects of a mental process which produces an object, a literary work, a particular form of expression which copyright protects'.[84] Both these courts hinge protection on the origin of a subject matter in the mind or mental processes and its eventual production or realisation through labour.

In 2009, the House of Lords held that having a good idea and composing a piece of music merit copyright. It also stressed that property in human intellectual creations

> provide an incentive to innovation and creativity. A person who has a good idea, as [the joint author] did when he composed the well-known organ solo that did so much to make the song in its final form such a success, is entitled to protect the advantage that he has gained from this and to earn his reward.[85]

The House of Lords in *Fisher v Brooker* in 2009 rewarding creative ideas and composing music does not sound dissimilar from the Statute of Anne 1710's cherishing composing and writing of books.

The French author's rights legislation is to be interpreted in the light of the human creativity underpinnings too. As Laligant, the author of a monograph on originality in French law, writes: 'by using the term "work of the mind" the legislator suggests that the protectable work by author's rights must be a product of human intellectual creative activity'.[86] Thereby highlighting both, the human conception of the work as well as the production of the work. The French Supreme Court concurs by requiring a work of the

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83 *Trade–Mark Cases*, 100 US 82, 25 LEd 550 (1879) 94, embraced in *Feist Publications Inc v Rural Telephone Service Co Inc* (1991) 499 US 340 at 344–45, 347.

84 *IceTV Pty Ltd v Nine Network Australia Pty Ltd* [2009] HCA 14, 239 CLR 458, 47, 49.

85 *Fisher v Brooker* [2009] UKHL 41, [2009] 1 WLR 1764 [8].

86 Olivier Laligant, *La véritable condition d'application du droit d'auteur : Originalité ou création?* (Presses Universitaires d'Aix-Marseille 1999) 14.

mind to translate author's 'individual imagination [or …] endeavour to [bring about a] personal creation.'[87]

The Preamble to the InfoSoc Directive refers to creativity or intellectual creation eight times.[88] Pursuant to its recitals, EU copyright warrants 'a high level of protection, since such rights are crucial to intellectual creation. Their protection helps to ensure the maintenance and development of creativity in the interests of authors, performers, producers, consumers, culture, industry and the public at large.'[89] Moreover, the term author's (individual and personal) intellectual creation plays a crucial role in defining the EU concept of work (Chapter VI.).

In the post-modern copyright law scholarship, there has been an ongoing questioning of whether the view of author allegedly based on Romantic ideals is detached from the reality of how authorial works come to existence.[90] Even in France, the continental bastion of author, legal scholars have noticed changes in the role of authors in the processes of creation. Professor Lucas and others proclaim that the romantic conception of author belongs to the past since nowadays the works are being created in teams, by consumers, on collaborative platforms and that new processes of creation tend to blur the line between 'author and a user-manipulator'.[91]

However, some dispute whether the copyright laws are bound to mimic perceptions of authorship currently trending in literary theory or art. For instance, Professor Bently

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87 Cour de cassation, Decision of 2 March 1999, n° 97-10.179.

88 Directive 2001/29/EC of 22 May 2001 on the harmonisation of certain aspects of copyright and related rights in the information society [2001] OJ L 167/10 ('InfoSoc Directive').

89 ibid recital 9.

90 For references to and comments on literature see Lionel Bently, 'Copyright and the Death of the Author in Literature and Law' (1994) 57 MLR 973.

91 André Lucas, Agnès Lucas-Schloetter and Carine Bernault, *Traité de la propriété littéraire et artistique* (5th edn, LexisNexis 2017) 174.

writes, 'the histories fail to establish conclusively any causative, necessary or determining link between the legal and the literary. All there is a complimentary and reinforcing connection, a parallel development.'[92] His view is that there is a lack of evidence to establish a historical precedent of such a practice.

Professor Lavik expressed a similar scepticism about the potential of aesthetics or humanities in general to provide insights into authorship for legal purposes or assist with improving the law on authorship.[93] Though, he admits that aesthetics can be helpful in clarifying more descriptive concepts such as satire, pastiche or adaptation.[94] This section proceeds relying on the scepticism as to the extent to which the law has been informed or even dragged by the historical literary or artistic imagination of author.

Without denying that the creativity landscape may be more complex, featuring 'collective, collaborative, individualistic, professional and user-generated'[95] creativity and with acknowledging that human beings do not create in silos, the position defended herein is that human beings nonetheless create as individuals. Indeed, individual and personal creativity can be perceived as part of a dialogue between an individual author and the others, and this dialogue may happen in teams, on various platforms or via social media.

Other scholars also advocate for individualistic creativity still having a valid place in the production of works or inventions. Professor Ng argues that '[t]he author's creativity as expressed in any work of literature or art represents the sine qua non of creative

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92 ibid 978.

93 Erlend Lavik, 'Romantic authorship in copyright law and the uses of aesthetics' in Mireille van Eechoud (ed), *The Work of Authorship* (Amsterdam University Press 2014) 79.

94 ibid 80.

95 Giancarlo Frosio, *Reconciling copyright with cumulative creativity: the third paradigm* (Edward Elgar Publishing 2018) 4–5. Frosio investigates creativity from the perspective of interplay between community, law, and market.

engagement with other authors, communities, and the rest of the society.'[96] Or, as put by Professor Drahos,

> authors, composers, musicians and scientists move in traditions and cultures which they react to or against. Equally a story about creativity which sees it as an outcome of tradition or other social forces ignores the capacity of individuals to step outside of social norms. Creative individuals are in one respect rule breakers.[97]

This section echoes that the cultural and societal determination of author's thinking and means of expression does not rule out creativity being conceived as an individualistic activity. Reiterating the importance of individual human creativity is particularly desirable in our times when human beings are absorbed by organisations which leaves them to feel disengaged, powerless and deprived of their individuality.

A British polymath, Bertrand Russell, pointed this out in his lecture on the role of individuality and individual initiative. As he observes, the scientists of the past were able to create as individuals but the scientists of the present need laboratories, equipment and other resources which makes them dependent on governments or other sponsors.[98] The scientist 'is thus no longer an independent worker but essentially a part and parcel of some large organisation. This change is very unfortunate. For the things which a great man can do in solitude would have to be more beneficial than those which he can do only with the help of the powers that be.'[99] The whole lecture argues that society should provide more freedom and opportunities for people to channel their individual, more or less exceptional,

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96 Alina Ng, *Copyright law and the progress of science and the useful arts* (Edward Elgar Publishing 2011) 94.

97 Drahos (n 73) 61.

98 Bertrand Russell, 'The Role of Individual' (BBC 9 January 1949) 21'40''ff <https://www.bbc.co.uk/sounds/play/p00hgk48> accessed 31 December 2021.

99 ibid.

talents and energy into ends beneficial for the society, otherwise the people will turn against it.[100]

3.2 Intrinsic Value of Human Intellectual Creations

In the limited space of this section, the aim is to offer a selection of reasons for having intellectual property to highlight the human intellectual creations' intrinsic value on the one hand and their social value on the other. It also explains why these reasons do not justify copyright in or patents for human-AI productions to the extent to which they are no human intellectual creations.

First, the intrinsic value of human intellectual creations rests on their qualities of being human, intellectual and creations. The human creator's dignity and personality are valuable because they mirror the value assigned to human beings. Respect for human dignity is the rationale behind moral rights: the paternity right with respect to both, inventions as well as works, the right to divulge the work and the right to integrity of the work. Moral rights and the right to fair remuneration for one's creation are those rights in intellectual property that can almost without a dispute be regarded and treated as human rights.[101] These two basic rights thus share with other human rights their sanctity, universality and inalienability.

The degree to which human dignity is recognised as a justificatory reason differs across jurisdictions. It probably enjoys the highest level of importance in Germany where a personal right in invention arises upon its creation (Chapter III.), intellectual property is

[100] Despite speaking from 1949, his suggestions are addressing the problems of today.

[101] Paul Torremans, 'Copyright (and Other Intellectual Property Rights) as a Human Right' in Paul Torremans (ed), *Intellectual Property Law and Human Rights* (3rd edn, Wolters Kluwer 2015) 226. Peter Yu, 'Reconceptualizing Intellectual Property Interests in a Human Rights Framework' (2007) 40 UC Davis L Rev 1039, 1081.

merely 'recognised'[102] by the state and not created, or personal and economic dimensions of author's rights create a unity under the monistic theory.[103] In jurisdictions where the protection of human dignity and personality is secured also via protection of one's creations, replacing 'human' with 'AI' and protecting AI intellectual creations is out of question.

In contrast, in common law jurisdictions, the language of investment, eg investment of labour and effort,[104] rather than the language of personality is used when referring to copyright subsistence. Also, historical petitions for patents in England cited '"the great charge, labour, cost and pains" (or similar sacrifices) that the petitioner had expended on his invention.'[105] Taken from this traditional, common law perspective, copyright in or patents for subject matter other than human intellectual creations could be enjoyed without any serious consequences.

It seems that in common law countries such an extension would leave the human dignity intact and require mere cosmetic changes, eg with respect to patent applications and derivation of title. Even without these changes, moral rights in common law jurisdictions could just become obsolete without impacting on the force of economic rights. However, even in the traditional common law context, there is something to lose by relinquishing moral rights. As Professor Ginsburg argues, there are good societal reasons for requiring an honest attribution (or acknowledgement of origin) which are discussed in the next section, under the social values heading.[106]

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102 Silke von Lewinski, *International Copyright Law and Policy* (OUP 2008) 38-39.

103 Karl-Nikolaus Peifer, 'UrhG § 11 Allgemeines' in Gerhard Schricker and Ulrich Loewenheim (eds), *Urheberrecht* (6th edn, CH Beck 2020) [3].

104 von Lewinski (n 102) 46.

105 MacLeod (n 57) 13.

106 Jane Ginsburg, 'Moral rights in a common law system' (1990) 1 Ent L R 121.

The intellectual and creative qualities of human intellectual creations are the evidence of relationships of authorship and inventorship. Put simply, they correspond to what is first in the creator, what the creator wills to transcend them and make to go into their creation. Hence the conception of inventions and works as direct and immediate products of human intellectual creative activity (Chapter III., V. and VI.). The inventorship and authorship reasons for protection come from natural law theories or fairness and desert-based theories.

The desert-based reasons are often intertwined with the personality-based reasons. For instance, as Professor Desbois writes about French author's rights, the rights are 'not considered instruments of a policy inspired by opportunistic considerations, [or] by a concern to stimulate intellectual creation; [but rather] they constitute modes of expression of respect owed to works of the mind and their creators'.[107]

According to the eighteenth-century German scholar Pufendorf, ownership in things is justified through 'labour and cultivation by men' because it would be 'improper that a man who had contributed no labour should have right to things equal to his by whose industry a thing had been raised or rendered fit for service'.[108] Thereby, the contribution of labour that renders the work fit for use, eg composing a musical work that can be listened to, in the process of creation makes the ownership of that work justified.

In the common law tradition, one usually refers to John Locke when it comes to labour-based justifications for intellectual property. In his Second Treatise of Government, he writes that a human being has a property in their person and body and that through the use of their body, they can have property in the direct and immediate fruits of their labour and exclude others from that property:

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[107] Henri Desbois, *Le droit d'auteur en France* (3rd edn, Dalloz 1978) 7.

[108] Samuel Pufendorf, *De Jure Naturae et Gentium* (Ex officina Knochiana, 1744) as cited in Stephen Buckle, *Natural Law and the Theory of Property: Grotius to Hume* (OUP 2002) 102.

> The labour of his body, and the work of his hands, we may say, are properly his. Whatsoever then he removes out of the state that nature hath provided, and left it in, he hath mixed his labour with, and joined to it something that is his own, and thereby makes it his property. It being by him removed from the common state nature hath placed it in, it hath by this labour something annexed to it, that excludes the common right.[109]

For other English thinkers, namely Adam Smith, Jeremy Bentham and John Stuart Mill, patents were a just compensation and reward for a person's mental labour and experimental endeavours.[110]

In the US context, Professor Mossoff puts the labour theory in spotlight. He refers to an influential US Supreme Court's decision of 1834 in which the labour argument was embraced. 'That every man is entitled to the fruits of his own labour must be admitted.'[111] Further, the US Patent Act 1836 refers to labour and desert policy when justifying the duration of patent rights which should secure 'for inventors the fruits of their inventive labors'.[112]

Justification of propertisation on the basis of the relationship between a human creator and their creation was described metaphorically by German philosopher Hegel. He recognises the process of 'imposing a form on a thing' as one of few justified ways how to take possession of a thing.[113] He elaborates further on how something can become existent as an object of property:

> It is only through the development of his own body and mind, essentially through his self-consciousness's apprehension of itself as free, that he takes possession of himself and becomes his own property and no one else's. This taking possession of oneself, looked at from the opposite point of view, is the translation into actuality of what one is according to one's concept, i.e. a potentiality, capacity, potency. In

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109 John Locke, *Second Treatise of Government* (Raleigh, NC: Alex Catalogue 1994) s 27.

110 Matthew Fisher, 'Classical Economics and Philosophy of the Patent System' [2005] IPQ 1, 8–10.

111 *Wheaton,* 33 US at 658 as quoted in Adam Mossoff, 'Who Cares What Thomas Jefferson Thought about Patents – Reevaluating the Patent Privilege in Historical Context' (2007) 92 Cornell L Rev 953, 988.

112 As expressed by Circuit Justice McLean as quoted in Adam Mossoff (n 111) 1006.

113 Georg Hegel, *Philosophy of right* as translated in Thomas Knox, *Hegel's philosophy of right* (OUP 2015) [54] and [56].

> that translation one's self-consciousness for the first time becomes established as one's own, as one's object also and distinct from self-consciousness pure and simple, and thereby capable of taking the form of a 'thing'.[114]

To put it simply: (i) there is a pure and simple self-consciousness (ii) which becomes one's own through the person taking the possession of oneself and (iii) as the person expresses what she is and she owns, such as her attainments, erudition, talents and this becomes embodied in something external and alienated,[115] the result can be thus regarded as property of that person.

An object can become a property of its author because it originates in the alienation of (or a part of) author's own self-consciousness. The object becomes an embodiment of the will[116] and hence the act of making the object creator's own can be regarded as a definitional element of the object itself. Hegel also distinguishes two stages of this alienation—making the self-consciousness one's own which is inward facing (internal) and giving a form to an object which is an activity upon the outer world. In the intellectual property, the Hegelian process of alienation corresponds to the process of creation of a work in which author's identity is channelled from conception, via composition to materialisation of the work itself (Chapter V.).

In the absence of a (de facto) human intellectual activity immediately creating a human-AI production, the result is no (de facto) human intellectual creation. It is noteworthy that the theories based on natural law and labour/desert considerations concern human intellectual creative activity immediately and directly bringing something into being, ie determining its expressive or inventive technical elements.

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114 ibid [57].

115 ibid [43].

116 ibid [53].

Some may argue that to bring about pretty, useful or innovative human-AI productions requires human intellectual activity in the form of preparing a training dataset, training an algorithm, tinkering with the results, etc. However, the intellectual activity poured into preparation of a dataset is a human intellectual creative activity in relation to that dataset, not the consequent human-AI productions. The intellectual activity poured into training an algorithm, adjusting its weights, setting up the parameters is a human intellectual creative activity in relation to that algorithm, not the consequent human-AI productions. There are legal means of protection of datasets or algorithms used in the AI-human collaborative process[117] so the creators of datasets or algorithms are not disadvantaged.

If these preparatory, up-stream activities or high-level inputs such as giving a guidance or supplying ideas to an AI-driven system were to be rewarded, then these kinds of activities would have to be rewarded also in the processes not involving an AI-driven system to preserve the fairness and labour/desert-based rationale and avoid discrimination. Hence, this would lead to inventorship not only for persons preparing datasets to be crunched by AI-driven systems but also persons preparing datasets for further processing by other persons. Similarly, if inventorship is recognised for setting up an AI-driven system (used as a tool) then inventorship should be recognised for setting up a microscope.[118]

The above-mentioned activities can be called pre-creative in relation to the expressive or technical human-AI productions. There may also be post-creative activities such as rearranging of the elements, editing etc. and some argue that the person who does this post-

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117 Jean-Marc Deltorn and Franck Macrez, 'Authorship in the Age of Machine Learning and Artificial Intelligence' in Sean M O'Connor (ed), *The Oxford Handbook of Music Law and Policy* (OUP 2019).

118 Some may argue that the inventive bit is done by the person who comes up with an idea how to make the AI-driven system to come up with technical solutions. But this, again, is an inventive solution in the field of data science and it solves a different technical problem than the one the human-AI productions purports to solve.

creative activity should be rewarded by copyright.[119] However, the post-creative activity on human-AI productions should be treated as any other follow-on creativity. If no new authorial work or invention of inventive quality emerges due to the transformative nature of the post-creative activity (which would become an intellectual creative activity in relation to the new subject matter), then there is no reason for a reward in the form of copyright or patents in a mere edition or finetuning of human-AI productions.

Finally, there are no good (meta-)reasons why the labour/desert-based reasons should assist in extending the meritorious activity to the pre-creative and post-creative activities with respect to a subject matter created by a human being, eg an original poem or original painting. If there are no good reasons for such an extension in case of human intellectual creations, then there are no better reasons for it in case of human-AI productions.

3.3 Social Value of Human Intellectual Creations

Human intellectual creations are valuable because they advance the progress of science and learning and the flourishment of culture. In this vein, the Statute of Anne cited advancement of learning as its primary goal. The US Constitution vesting the powers to enact legislation in intellectual property matters in the Congress signifies its importance to the New World's settlers. As put by one of the federalists, James Madison, the Congress should have the respective powers:

> to promote the progress of science and useful arts, by securing, for a limited time, to authors and inventors, the exclusive right to their respective writings and discoveries. […] The copyright of authors has been solemnly adjudged, in Great Britain, to be a right of common law. The right to useful inventions seems with equal reason to belong to the inventors.[120]

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119 Pamela Samuleson, 'AI authorship?' (2020) 63 ACM 20, 22.

120 James Madison, 'Federalist No. 43' (Library of Congress, undated) <https://guides.loc.gov/federalist-papers/text-41-50#s-lg-box-wrapper-25493407> accessed 21 March 2021.

In the mid-twentieth century, the US Supreme Court concurs and explains the rationale for the powers of the Congress in consequentialist economic terms.

> The economic philosophy behind the clause empowering Congress to grant patents and copyrights is the conviction that encouragement of individual effort by personal gain is the best way to advance public welfare through the talents of authors and inventors in 'Science and useful Arts.' [121]

These accounts reveal a shared underlying logic: patents and copyright incentivise certain activity through rewarding that activity. This activity being the intellectual creative activity of authors and inventors. The instrumentality of talents of authors and inventors seems omnipresent. Professor Machlup, who conducted an economic review of the US patent system, found that 'the profit expectations connected with the hope for a patent monopoly may induce inventive talents to exert their efforts'.[122] He further acknowledges that even after the ways of organising research and innovation in technology have changed over time, the ultimate task—to induce inventive talents to exert their effort—remains unchanged.[123]

Though the social value of human intellectual creations occupies a more prominent place in the common law jurisdictions, Professor Ginsburg's research into historical sources in France and the USA offers a more balanced view. She asserts that the first copyright laws in both countries were based on furtherance of private as well as public interests which were 'of equal weight'.[124] She shows that the education policy was at the forefront in France[125] almost as much as in the USA and that reward for 'men of industry or of talents'[126] was as important in the USA as in France.

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121 *Mazer v Stein*, 347 US 201, 219 (1954).

122 Fritz Machlup, *An Economic Review of the Patent System* (Committee Print 1958) 23–24.

123 ibid 36.

124 Jane Ginsburg, 'A tale of Two Copyrights: Literary Property in Revolutionary France and America' (1991) 147 RIDA 125, 143.

125 ibid 163.

126 ibid 145 quoting a US historic source.

The US and French examples illustrate how the goal of advancing learning and education goes hand in hand with providing incentives to create to individuals. Indeed, the historical sources seem to agree that authors, inventors and the public have a shared interest in a wide and smooth dissemination of works and implementation of inventions, whereas the perception of intermediaries in advancement of learning changes over time.

The progress of science, advancement of learning and flourishment of culture usually evokes producing more technology, more books and more art (which nowadays may not necessarily mean more human intellectual creations, Chapter II.). Building on Fromm's work, this section argues that there is a social value unique to producing human intellectual creations as opposed to mere having more technology, more books and more art.[127] Applying his writing to the situation at hand, thanks to producing human intellectual creations the society becomes richer in writers, artists and inventors and thus more learned and cultured through an active, direct and creative engagement with letters, arts and technical puzzles.

A special social added value can be perceived also in the processes of creation and invention in which human beings work together and learn from each other. Practicing and nurturing the traditions of authorship or know-how in problem solving that pass from generations of writers, artists and engineers to new generations of writers, artists and engineers has its own social value. Pedagogy would call this practice apprenticeship and spell out its social benefits of 'enculturation, […] participation in a social group, and [preservation of] competence and social identity in relation to the community of practice'.[128] Putting subject matter without human creators on equal footing with human

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127 Erich Fromm, *To Have or to Be?* (Bloomsbury 2012).

128 Daniel Pratt, 'Good Teaching: One Size Fits All?' (2002) 93 New Directions for Adult and Continuing Education 5, 10.

intellectual creations may, eventually, lead to vanishing of the traditions of authorship and problem solving, including skills and knowledge that cannot be readily datafied (ie turned into data).

In addition, there is a social value in attribution of a work or an invention because it fuels the incentives to create. According to Professor Quaedvlieg, mentioning a name of the author on a copy of work increases author's creativity poured into future works.[129] A survey conducted on a sample of ca 9,000 European inventors in early 2000's shows that '[t]he inventors consider monetary rewards and other rewards like career advances or benefits less important than personal and social rewards, like personal satisfaction, prestige, reputation, and the contribution to the performance of the organization'.[130] To realise those reputational rewards and incentives the creators must first create something and second be recognized and named as the inventors or authors. Needless to mention that this social value materializes exclusively with respect to self-conscious creators capable of responding to these incentives.

Another example of social value of human intellectual creations correctly attributed is the enhancement of informational value of the subject matter itself. As Professor Ginsburg argues, attribution assists the public with its orientation on the market, similarly to trade marks.[131] Moreover, attribution enhances the communication function of works because it enables the audience to perceive it with its origin in mind and interpret it accordingly. Since an AI-driven system cannot communicate in the sense of creating a

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129 Antoon Quaedvlieg, 'Authorship and Ownership: Authors, Entrepreneurs and Rights' in Tatiana-Helenē Synodinou (ed), *Codification of European copyright law: challenges and perspectives* (Wolters Kluwer Law & Business 2012) 202.

130 Alfonso Gambardella and others, 'The Value Of European Patents – A Survey of European Inventors – Final Report of The PatVal EU Project' (*europa*, January 2005) <http://ec.europa.eu/invest-in-research/pdf/download_en/patval_mainreportandannexes.pdf> accessed 31 December 2021.

131 Ginsburg (n 106) 122.

meaning, but it merely determines expressive elements, it does not make sense to extend this social value of attribution to human-AI productions. With respect to technology, knowing its origin is crucial for trust and its implementation. It would be curious how much trust a piece of technology without a human inventor would enjoy, especially in a field like cyber security.

3.4 Value of Expressive Subject Matter and Inventive Technical Subject Matter

Finally, the value that human intellectual creations embody due to their expressivity or inventive technicality should be discussed. These qualities correspond to the secondary patentability requirements and the requirement of (literary, dramatic, musical or artistic)[132] form in copyright.

There have been attempts to justify property in expressive or inventive, technical subject matter without any references to authorship or inventorship. One of the classical examples is Hardin's article The Tragedy of the Commons in which he argues that scarce resources are more sustainably managed as private property or under exclusive rights than as the commons.[133] He warns against a tragic depletion of resources that are accessible to everyone in an uncontrolled way and in certain case he even calls '[t]he alternative of the commons […] too horrifying to contemplate.'[134]

However, the practice has shown that also in case of private property there can be too much of a good thing. Heller and Eisenberg point to the fact that privatisation of biomedical

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132 This is valid foremost for the UK copyright, for the EU copyright it would be 'providing enough creative freedom' and in France and Germany a perceivable form of expression would suffice, see Chapters VI. and VII.

133 Garrett Hardin, 'The Tragedy of the Commons' (1968) 162 Science 1243, 1244–45.

134 ibid 1247.

research in the USA led to obstacles in the form of overlapping patent rights owned by different private parties which, in effect, impedes the downstream innovation.[135] In a similar vein, Shapiro shows how patent thickets in telecommunication industry increase transaction costs and harm innovation.[136]

Another account justifying property in technical solutions is a social contract theory. Under this theory, patent rights are a consideration offered by the public in exchange for knowledge disclosed by the inventor. A direct consequence of introducing this theory was a new patentability criterion—the sufficiency of disclosure of the invention. For instance, Machlup refers to this set of reasons as exchange-for-secrets theory because it is oriented at disclosing inventions in a sufficient (or enabling) manner in contrast to keeping them in secrecy.[137] It is noteworthy though that the social contract theory has never operated self-sufficiently. It rather stands on the shoulders of the property, reward, and incentive theories as it does not rely on disclosing subject matter that have not been devised by a human being.

Another social value brought by patent system (independently of the origin of invention) is formulated by Professor Kitch in his prospect theory. He observes that the patent system promotes an efficient allocation of opportunities (prospects).[138] In the view presented here, this does not necessarily mean that one should have a patent system for otherwise opportunities would not have been allocated efficiently. Moreover, as Kitch himself acknowledges, his prospect theory is only complementary to rewards theory which is founded on human inventorship.[139]

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135 Michael Heller and Rebecca Eisenberg, 'Can Patents Deter Innovation? The Anticommons in Biomedical Research' (1998) 280 Science 698, 699.

136 Carl Shapiro, 'Navigating the Patent Thicket: Cross Licenses, Patent Pools, and Standard Setting' (2000) 1 Innovation Pol'y & Econ 119.

137 Machlup (n 122) 21.

138 Edmund Kitch, 'The Nature and Function of the Patent System' (1977) 20 J Law Econ 265.

139 ibid 266.

From a utilitarian perspective, ie the perspective of maximising the overall good in the society, one may legitimately ask two questions. First, do expressivity or inventive technicality as such bring anything valuable? In the view presented here, the expressive or inventive technical properties as such are neither good nor bad for the society. The obvious examples of their ambivalence are genetic engineering, nuclear fission, cyber security detection tools, pornography or Machiavelli's The Prince. Their utility for the society depends on their use and the mere fact of their disclosure does not guarantee their use for good ends.

To be more accurate, their disclosure does not even guarantee their use. As argued by Schumpeter, '"getting new things done" is not only a distinct process but it is a process which produces consequences that are an essential part of capitalist reality.'[140] The claim that a mere disclosure does not automatically guarantee the overall good has been confirmed during the covid pandemic. On 3 February 2022 it was announced that South African scientists managed to create a copy of Moderna's vaccine.[141] Despite it being a matter of the utmost urgency, it took almost eight months to bring a disclosed technical solution to practice because of raw material shortages and lack of a complete recipe for creation of the vaccine.[142]

Further, utility is needs, preferences and time sensitive. For instance, an invention made by a Max Planck Institute's scientist Karl Ziegler for which he also won a Nobel Prize in 1963 enabled a widespread use of plastics for everyday objects like shampoo bottles or

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140 Joseph Schumpeter, 'The Creative Response in Economic History' (1947) 7 Journal of Econ Hist 149, 152.

141 Amy Maxmen, 'South African scientists copy Moderna's COVID vaccine' (*nature*, 3 February 2022) <https://www.nature.com/articles/d41586-022-00293-2> accessed 4 February 2022.

142 ibid. The last patent covering Moderna's mRNA-1273 COVID-19 VACCINE was granted on 26 June 2021. Moderna, 'Program Patents' (*moderna*, undated) <https://www.modernatx.com/patents> accessed 4 February 2022.

plastic bags.[143] The invention once acclaimed as a progress of science may nowadays be regarded as a progress towards extinction, especially by those concerned about the state of environment to which the wide use of plastics contributed.

Second, what is so special about the inventive information in the technical fields that would merit them a monopoly of twenty years in contrast with inventive information in the field of commerce? If an idea is novel, inventive and useful, in capitalist markets it should find a way to earn its living. The economic reason for granting a time-limited monopoly is that but for the monopoly, the literature, art and technology would not have been brought to daylight because their making incurs high fixed costs while their subsequent use or reproduction by others incur only low variable costs.[144]

Since the space of this section does not allow to delve into the law & economics literature, the one point worth making is that the situation is more complex than the above description of market failure suggests. Foremost, a lot depends on parameters that differ market to market, eg market structure, elasticity of demand, effects of intellectual property on market power. As put by Shapiro in a nutshell, while the prospect of temporary market power (which may or may not come with intellectual property) spurs innovation (Schumpeter), once a firm is an incumbent it will refrain from disruptive innovation (Arrow) unless it fears of being superseded by another, more innovative firm.[145]

As Professors Landes and Posner point out the adequacy of incentives to invent differ depending on the height of the fixed costs, possibilities to invent around and availability of

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143 Birgit Fenzel, 'Patent solution in a canning jar' (*Max-Planck-Gesellschaft* 11 August 2014) <https://www.mpg.de/8361429/flashback-ziegler> accessed 31 December 2021.

144 Carl Shapiro and Hal Varian, *Information Rules* (Harvard Business School Press 1999) 21.

145 Carl Shapiro, 'Competition and Innovation: Did Arrow Hit the Bull's Eye?' in Josh Lerner and Scott Stern (eds), *The Rate and Direction of Inventive Activity Revisited* (University of Chicago Press 2012) 400.

substitutes on the market.[146] This necessarily creates a discrimination between the fields of technology to which inventions belong. For instance, while patents for pharmaceutical products would arguably be justified, patents for software not so.

Professor Breyer takes books as the example and estimates how abolishment of copyright would impact incentives to produce them. He arrives at different conclusions for different kinds of book precisely because of different market characteristics of their respective markets.[147] He anticipates that college textbooks could be viable without copyright, whereas elementary and high school textbooks would experience difficulties. This is because college books are more profitable and their authors would likely write them anyway in the course of their employment by colleges.[148] In contrast, elementary and high school textbooks are less profitable and their authors are usually employed by publishers who would be directly hit by the abolishment of copyright.[149] Hence copyright, too, is necessary to incentivise productions only under certain circumstances.

Since patents are there for subject matter in all technical fields and copyright for any literary, dramatic, musical or artistic subject matter[150] and since the market failure argument works only under certain circumstances on the market, patents and copyright do not seem to be the right regulatory tools to secure the recoupment of high fixed costs. The universality of protection of inventions and works stems from them all being human intellectual creations and is explained by the human rights aspects of the fundamental rights

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146 William Landes, Richard Posner, and Richard Posner, *The Economic Structure of Intellectual Property Law* (Harvard University Press 2003) 300.

147 Stephen Breyer, 'The Uneasy Case for Copyright: A Study of Copyright in Books, Photocopies, and Computer Programs' (1970) 84 Harvard L R 281, 309ff.

148 ibid 310.

149 ibid.

150 As disclaimed at the beginning of Chapter V., this thesis is concerned with copyright in any of the classic Berne Convention works. Sound recordings, audiovisual recordings are outside the scope of this thesis' consideration.

in intellectual property. None of the utility or market-based theories can explain or justify the universality and equality in treatment of works and inventions.

The last, catch-all category of reasons worth addressing may be called an intellectual property folklore because it became part of tradition and pops up in ad hoc variations. It is mostly based on the argument that protection is justified because bringing the subject matter into being requires some investment (even if not extraordinarily high or even if not in the form of human intellectual creative activity) and this investment should be protected from free riders.

One of its iterations is reaping without sowing, ie a holder of a subject matter should be able to exclude others from its use so that the others do not reap where they have not sown. It implies that, as Michael Spence put it, 'it is wrong to reap without sowing if someone else, and in particular the sower, has a stronger claim to that which is reaped.'[151] However, as Spence points out, the problem is that the phrase assumes that there is a person who has a better right than anybody else and this assumption cannot be justified by the phrase itself.[152]

Another example of folklore is Justice Peterson's rule of thumb '[…] there remains the rough practical test that what is worth copying is prima facie worth protecting'.[153] This test, too, relies on the assumption that there is a person with a better right than the other person using the work. A similar argument was made by Justice Birss re the position of Thaler, the owner and creator of DABUS, in relation to the claimed technical solutions: '[l]ooking at Dr Thaler's position as it stands, it is not obvious that there is any other person

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151 Michael Spence, 'Justifying Copyright' in Daniel McClean and Karsten Schubert (eds), *Dear Images: Art, Copyright and Culture* (Ridighouse 2002) 396.

152 ibid.

153 *University of London Press Ltd v University Tutorial Press Ltd* [1916] 2 Ch 601 (Ch) [608].

with a better right than Dr Thaler's to be granted patents for these inventions but if there is then they can come forward.'[154]

In this line of thinking, the underlying presumption seems to be that protection must be granted if someone claims it. But just because nobody with a better title comes forward, it does not and should not make the claimant or applicant entitled. Hence, these arguments do not justify why the subject matter should be protected. If need be, these arguments may serve well for protection of investment by trade secrets, unfair competition or unjust enrichment (provided further conditions are met).[155]

Slightly outside the context of the classic patent and copyright justifications, some argue that copyright and patents should be granted for human-AI productions to spur innovation. For instance, the UK IPO in relation to AI and IP states that any intervention should (first) 'encourage innovation in AI technology or promote the use of AI for the public good; and [second] not undermine IP's wider role in promoting human creativity and innovation.'[156] The innovation argument was also used by the Federal Court of Australia construing the statutory term of inventor 'in a manner that promotes technological innovation and the publication and dissemination of such innovation by rewarding it, irrespective of whether the innovation is made by a human or not.'[157]

Both, the suggestion that copyright and patents are the right tools to spur innovation in AI (UK IPO) and the statement that a flexible interpretation of 'inventor' spurs

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154 *Stephen Thaler v Comptroller General* (n 63) [85].

155 In common law jurisdictions, the protection of investment is a valid argument for protection by neighbouring rights if those subject matter correspond to entrepreneurial works.

156 UK IPO, 'Impact Assessment' (*gov* 29 October 2021) <https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1029930/impact-assessment.pdf> accessed 18 December 2021.

157 *Thaler v Commissioner of Patents* [2021] FCA 879 [124].

innovation (Federal Court of Australia) lack grounding in evidence.[158] In fact, the available evidence suggests the contrary. The present evidence shows that human-AI productions are being produced under legal uncertainty about their intellectual property status. To take the drug discovery as an example, in the course of the last two years characterized by the legal uncertainty hanging over patentability of outcomes generated by AI-driven systems, firms using AI in drug discovery managed to raise sums ranging from $100 million to $500 million per funding call or an IPO.[159]

Hence, it is questionable whether there is any actual need for a regulatory intervention to spur innovation in such a thriving industry. Will the absence of copyright and patents decrease incentives to use AI-driven systems in the production of technology, books, computer programs or art? Given the present lack of answers and solid empirical evidence of a need for a positive regulatory action, the compelling reasons for protecting subject matter other than human intellectual creations are still being awaited.

3.5 Conclusions on the Normative Issue

In the end, it is concluded that copyright and patents are justified only for literary, artistic expressive subject matter and inventive technical subject matter that are human intellectual creations. The evolution of copyright and patent laws shows that the component of human intellectual creations has been present and key to establishing protection in the UK, Germany and France roughly since the eighteenth century.

The justifications based on human dignity, fairness and labour/desert lend the systems their universality and moral standing. A subject matter that lacks human authorship and

158 In case of the UK IPO this is forgivable because the UK IPO's call for views aims at gathering the evidence.

159 Neil Savage, 'Tapping into the drug discovery potential of AI' (*nature*; 27 May 2021) <https://www.nature.com/articles/d43747-021-00045-7> accessed 31 December 2021.

human inventorship is incapable of sharing those universality and morality aspects of protection. Besides lacking the intrinsic value of human intellectual creations, these subject matter should not be put on equal footing with human intellectual creations because their processes of production do not bring the social added value of the processes involving human authorship and inventorship.

In other words, the extension of copyright and patent protection to subject matter other than human intellectual creations is not justified by the current human dignity, fairness, labour/desert-based theories and incentives to create. Incentives to produce and invest, market failure or fair competition reasons could justify their special treatment or protection, but not by copyright or patents.

Relatedly, some frame the normative issue of the AI and IP debate as 'why not?', ie why not to protect an expressive subject matter or an inventive technical subject matter by copyright or patents.[160] But this framing ignores that for centuries human authors and human inventors have been challenged to give good, positive reasons why they merit the protection. As a result, the current copyright and patent systems are built on answers as to why yes, chief among them those stemming from the intrinsic and social value of human intellectual creations.

[160] For instance, the Federal Court of Australia has surrendered to this tempting question of why not in *Thaler v Commissioner of Patents* (n 157) [121].

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