



The Neuroscience of Creativity and Copyright.  
Reconsidering the term of protection.

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## Abstract

What is creativity? Throughout the ages, creativity has been an invaluable trait: from its usefulness in creating prehistoric tools, to its beauty expressed in Renaissance paintings or in Einstein's mathematical formulas. Nowadays, as humanity enters an age of unprecedented levels of change and uncertainty, it seems that it will continue in high demand. Nonetheless, it has remained an elusive concept.

Fortunately, thanks to recent developments in the neuroscientific study of creativity, it is possible to obtain greater insights regarding its cognitive mechanisms, in order to comprehend how creativity may be affected in its sociocultural interaction.

In the legal realm, the configuration of creativity has been an on-going subject in the history of copyright. Each different view brought with it fundamental changes, particularly in respect to the term of protection. In turn, such alterations proved to exert substantial effects on the development of creativity. Nonetheless, this period of discordance seems to be over, as the terms of protection become crystallized in international agreements and globally homogeneous.

In light of such consensus, this paper will contrast the agreed conception of creativity, subjacent to the formulation of modern terms of protection, with a systems model of creativity as supported by its neuroscientific study. From this comparison, it should be possible to reveal a path for further harmonization between the two approaches in order to achieve a greater societal development of creativity.

Keywords: Creativity, Creative thinking, Copyright, Term of Protection, Neuroscience of Creativity.

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# Chapter 1 - Introduction

The digital revolution has allowed an unprecedented collection, storage, sharing and processing of data,<sup>1</sup> continuously fuelled by its economic value and encouraged by its usefulness towards reaching a promising knowledge society.<sup>2</sup> However, such a path has not been without incidents, as the arrival of the Information Age has been accompanied by novel and complicated realities: from the moral dilemmas of gene editing<sup>3</sup> humans<sup>4</sup> and the dangers of spreading ill-intended mutations,<sup>5</sup> to an increasing substitution of human labor by artificial intelligence,<sup>6</sup> and the intensification of natural and humanitarian damages due to climate change,<sup>7</sup> to name only a few. Nonetheless, the possibility to solve these enigmas also resides in harnessing such capacity to process and share enormous amounts of information, although this potential can only be thoroughly exploited when combined with creativity,<sup>8</sup> from which innovative ideas can emerge out of an otherwise seemingly unrelated conglomerate of data.<sup>9</sup>

Thus, as technological and cultural changes take place at an unprecedented rate, creativity becomes an invaluable tool by permitting one's adaptation to new conditions and the production of innovative solutions to tackle ensuing challenges. However, the development of creativity relies on the interaction between individuals and their sociocultural environment which, in turn, is affected by existing legal regimes. A particularly relevant influence is the copyright legal system,<sup>10</sup> which has two fundamental purposes: first, to incentivize authors to produce creative works by granting them exclusive rights regarding their creations in order for them to economically exploit and control their use. Secondly, to limit such exclusivity so that the author's work is somehow accessible to the public to use it, in an effort to enrich, among other things, the public's creativity, and create a positive cycle of creative thinking and production.<sup>11</sup>

As can be understood, the grant of exclusive rights to the author conflicts with the public's access to his work, which translates into a need to conciliate these two interests. One of the elementary ways by which copyright does this is by establishing a certain term of

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<sup>1</sup> Martin Hilbert, Priscila López, "The World's Technological Capacity to Store, Communicate, and Computer Information" (2011), 332(6025) *Science* 60.

<sup>2</sup> Peter F. Drucker, *The Rise of the Knowledge Society* (WQ Spring 1993).

<sup>3</sup> Irus Braverman, 'Editing the Environment: Emerging Issues in Genetics and the Law' (2017) University at Buffalo School of Law Legal Studies Research Paper No. 2017-005.

<sup>4</sup> Gina Kolata and Pam Belluck, 'Why are scientists so upset about the first crispr babies?' (5 December 2018), *The New York Times* < <https://www.nytimes.com/2018/12/05/health/crispr-gene-editing-embryos.html> > Accessed 18 December 2018.

<sup>5</sup> *The Economist*, 'Gene drives promise great gains and great dangers' (November 8<sup>th</sup> 2018) < <https://goo.gl/7Hcc94> > Accessed 5 January 2019.

<sup>6</sup> Michael Chui, James Manyika, and Mehdi Miremadi, 'Where machines could replace humans—and where they can't (yet)?' (2016), McKinsey Quarterly.

<sup>7</sup> Han Somsen, 'The End of European Union Environmental Law: An Environmental Programme for the Anthropocene' in *Environmental Law and Governance for the Anthropocene* (Hart Publishing 2017).

<sup>8</sup> Rita J. King, 'The Origin of the Imagination Age' (2016), LinkedIn.

<sup>9</sup> Robert Root-Bernstein, 'Multiple Giftedness in Adults: The Case of Polymaths' (2009), *International Handbook on Giftedness*. Doi: 10.1007/978-1-4020-6162-2\_42 Accessed 25 April 2018.

<sup>10</sup> Erez Reuveni, 'Copyright, Neuroscience, and Creativity' (2013), 64(4) *Alabama Law Review* Vol. 735.

<sup>11</sup> Francis Gurry, 'Building respect for intellectual property – stimulating innovation and creativity' (2016) *WIPO Magazine*, Special issue 11/2016.

protection. In short, this term regulates for how long the author is granted the mentioned exclusive rights over his works, after which the public is able to access and use the work without the author's permission. With this being said, such term of protection becomes a focal point in the relation between creativity and copyright, as it bears an important influence in determining how much authors are incentivized to produce creative works, but it also establishes how quickly the public is able to obtain and use those works for their own creative endeavors. Therefore, the achievement of an equilibrium between both interests is essential for society's development of creativity, since an unbalance results in sub-optimal scenarios: if author's exclusive rights are granted for too long, it will take a long time before the public can freely use his works, while if authors are protected for a period too short, they will be less incentivized to create.

Historically, such balance has been tampered according to different conceptions of what creativity was and how the process of creative thinking happened. In different countries, throughout the ages, the author and his capacity to create artistic and literary works has been configured in several ways, from being considered a mere servant of the public, to his adoration as a genius. These disparate conceptions have resulted in equally distinct formulations of what the right term of protection ought to be.

However, as will be seen, most of the arguments utilized by both approaches were originally rooted in philosophical discourses about the nature of creativity without much empirical evidence, until the appearance of economic studies focused on calculating what the optimal period of copyright protection would be. To these examinations, the recent advancements in the scientific study of creativity must be added, as they permit an unprecedented comprehension of creativity and how its cognitive mechanisms function. Consequently, the conceptualizations of creativity referred in the formulation of modern terms of copyright protection must be put under the light of current neuroscientific knowledge on the functioning of creative thinking, so that the resulting contrast permits copyright to formulate a new conception of creativity under the light of the findings of its scientific study.

For this purpose, Chapter 2 will first define what creativity is under the findings of the scientific research of creativity, particularly under a systems model notion, which configures creativity as depending on the interaction of the individual and his sociocultural context. Subsequently, the chapter will close with an analysis of the importance of creativity during humanity's' evolutionary process to frame its value for the impending uncertainties of the future. Afterward, Chapter 3 will be dedicated to the understanding of the neurobiological underpinnings of creative thinking to obtain a detailed notion of this prerequisite of creativity, in order to be added to the overview granted by the previous chapter general analysis. Combining Chapter 2 and 3, a systems notion of creativity added by a neuroscientific knowledge of the individual's process of creative thinking will produce a clear picture to be able to guide future terms of copyright protection. Hence, Chapter 4 will provide a historical overview of how copyright's notion of creativity has influenced terms of protection, in order to subsequently contrast it with the provided scientific research on creativity and reconsider their alignment for the development of creativity.

## Research Questions

How does copyright's conception of creativity shape current terms of protection, and how can they be aligned with scientific research on creativity to further its development?

- What is Copyright's conception of creativity?  
How does this shape terms of protection?  
How does this affect the development of creative thinking?
- What is creativity? Why is its development important?
  - o How has creativity been defined historically?
  - o What is the modern scientific definition of creativity?  
Why did humans develop creativity? / Why was it important evolutionarily?
  - o Why is creativity important for present and future times?
- How is creative thinking developed?
  - o What are the cognitive mechanisms involved in the development of creativity?
- How does copyright's conception of creativity shape its term of protection? How can it be aligned towards creativity's development?
  - o What is copyright?
  - o What are the current terms of protection?
  - o How does copyright conceptualize creativity?
    - Historical conceptualization of creativity.
  - o How has that conceptualization justified current terms of copyright protection?
  - o How may current terms be aligned with scientific research on creativity to further its development?

## Methodology

The original idea for the present thesis came from the article named 'Copyright, Neuroscience, and Creativity' written by Erez Reuveni, from which I first obtained the idea of integrating the study of the neuroscience of creativity and copyright. I subsequently verified articles that cited Reuveni's work, namely in Google Scholar, to search for others that integrated both disciplines. The references utilized in the article also did not point to any similar work.

Subsequently, my searches were mostly done in SSRN, Google Scholar, Elsevier, and Taylor&Francis Online. Searching with the words 'neuroscience' and 'copyright' for articles connecting Copyright and Neuroscience, I was not able to find a single one besides Reuveni's work. Although 'creativity' and 'copyright' did lead to some results, none of them related it with the neuroscientific study of creativity.

Thus, being creativity such a utilized concept in Copyright, I thought that the latter could somehow be improved from learning about its scientific foundations, particularly since

no articles had been done about it besides Reuveni's, from which this thesis, in fact, deviates substantially since his article is more related with Internet neutrality.

For the second chapter, I performed a literature review of the existing articles and books concerned about the scientific definition of creativity. Albeit works were used, for the most recent guidance I utilized the Cambridge Handbook of Neuroscience of Creativity from 2018, and based the proposed systems notion of creativity on M. Csikszentmihalyi, 'Society, Culture and Person: A Systems View of Creativity'. For the second part, regarding the importance of creativity, I did a literature review on the biological evolution of creativity and books regarding the topic of humanity's future such as Harari's '21 Lessons for the 21<sup>st</sup> Century'

For the third chapter, the literature review concerned neuroscientific articles detailing the different processes involved in creative thinking such as Working memory, Long-term memory, Short-term memory, the concepts of generativity, mind-wandering, divergent and convergent thinking, among others. All these were studied in order to understand how creative ideas were neurobiologically originated in the human brain.

Regarding the fourth chapter, a literature review was performed in respect to the evolution in the artistic world of the conception of the author, alongside a comparative approach between copyright legislations of France, UK, and the USA. These jurisdictions were the chosen ones, alongside the study of the Berne Convention, since they represented the major philosophies regarding copyright and its notion of creativity. This was done to assess how copyright conceptualized creativity throughout history and changed its terms of protection accordingly, so that notion could be integrated with that of the previous chapters. Two main works were utilized in this section: Peter Baldwin, 'The Copyright Wars. Three Centuries of Trans-Atlantic Battle' and Giancarlo Frosio, 'Reconciling Copyright with Cumulative Creativity, The Third Paradigm'. Both these works compared the notion of creativity with their contemporary copyright regime.



## Chapter 2 - What creativity is and why it matters

### 2.1. What creativity is and what it isn't

Throughout history, the conception of what creativity is has been frequently shrouded in mystery, either due to its supernatural origins or to its conception as being an inexplicable phenomenon<sup>12</sup> beyond rational comprehension.<sup>13</sup> Fortunately, as will be seen, the path to unraveling the mysteries of creativity has already commenced, and significant progress has been made towards its scientific understanding.

Although the establishment of a rigorous and all-encompassing<sup>14</sup> description of creativity has been much debated,<sup>15</sup> the modern standard definition was conceived in 1953 by Morris I. Stein.<sup>16</sup> He considered that 'the creative work is a novel work that is accepted as tenable or useful or satisfying by a group in some point in time'.<sup>17</sup> This bipartite definition has been the consensual standard,<sup>18</sup> requiring the production of something to be both original and effective<sup>19</sup> to be considered creative.<sup>20</sup> Originality describes something that is new, unique, unusual or non-conventional, though it is not enough to attribute creativity. Novel creations or ideas must also be effective or useful<sup>21</sup> since, for example, completely random constructs, even if original, won't be creative if they lack utility.<sup>22</sup>

Employing Stein's bipartite criteria to assess creativity,<sup>23</sup> this thesis will be based on the notion that the creation of a creative product (tangible or intangible) derives from a

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<sup>12</sup> Jonathan Bate, *The Genius of Shakespeare* (Oxford University Press 1998) 162.

<sup>13</sup> Margaret A. Boden, 'Creativity as a Neuroscientific Mystery' 3, 3 in Oshin Vartanian, Adam S. Bristol, and James C. Kaufman, *Neuroscience of Creativity* (MIT Press 2013).

<sup>14</sup> For the differences in distinct theories of creativity, see generally, Kozbelt et al, 'Theories of Creativity'.

<sup>15</sup> Some even understand that creativity's nature defies such definition. See generally, E. Paul Torrance, 'The nature of creativity as manifest in its testing' (1988) in R. J. Sternberg (ed), *The nature of creativity* (Cambridge University Press 1988) 43; See generally, against Stein's definition: Dean Keith Simonton, 'Creative Ideas and the Creative Process: Good News and Bad News for the Neuroscience of Creativity' in Rex E. Jung and Oshin Vartanian (eds), *The Cambridge Handbook of the Neuroscience of Creativity* (Cambridge University Press 2018) 9.

<sup>16</sup> Runco, Jaeger, 'The Standard Definition of Creativity' 95; See generally, Morris I. Stein, 'Creativity and culture' (1953) 36(2) *Journal of Psychology* 311.

<sup>17</sup> Morris I. Stein, 'Creativity and culture' (1953) 36 (2) *Journal of Psychology* 311, 311–312.

<sup>18</sup> Selcuk Acar, Cyndi Burnett and John F. Cabra, 'Ingredients of Creativity: Originality and More' (2017) 29 (2) *Creativity Research Journal* 133, 133.

<sup>19</sup> Effectiveness may also be considered as fit or appropriateness. It has to be valued by some E.g, the requirement for creativity to be 'worthwhile' and 'compelling' in A.J Copley, *Creativity* (Longmans 1967) 67; Mark A. Runco, 'Creativity research: Originality, utility, and integration' (1988) 1(1) *Creativity Research Journal* 1, 4.

<sup>20</sup> Runco, Jaeger, 'The Standard Definition of Creativity' 92.

<sup>21</sup> Already in 1839, Bethune declared that 'If the examination be made, it will be found, that those works of Genius are the most appreciated, which are the most pregnant with truth, which give us the best illustrations of nature, the best pictures of the human heart, the best maxims of life, in a word, which are the most useful' in George Washington Bethune, *Genius: An address delivered before the literary societies of Union College* (G. W. Mentz & Son 1837) 12

<sup>22</sup> Runco, Jaeger, 'The Standard Definition of Creativity' 92.

<sup>23</sup> According to Rex E. Jung and Oshin Vartanian, such a definition seems appropriate since 'it is not overly broad, and its components can have tractable neuronal correlates' in Rex E. Jung and Oshin Vartanian,

creative idea which, in turn, originated from a creative process, referred to as ‘creative thinking’, carried out by a creative individual.<sup>24</sup> As will be seen in Chapter 3, creative thinking encompasses certain cognitive functions that allow the individual to generate a creative idea. Without this capacity, there can be no creative production. However, creative thinking will also be understood as being connected with the social and cultural aspects of the environment in which the creative individual exists.<sup>25</sup> In fact, a complete understanding of creative thinking is not possible without taking into account this relation. Hence, creative thinking will be here conceptualized under a systems notion of creativity, which constructs the latter as emerging<sup>26</sup> from the relation of an individual, a domain and a field:<sup>27</sup>

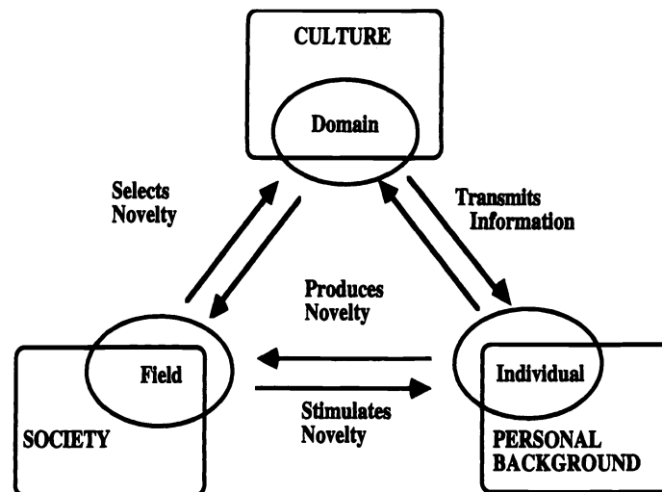


Figure 1: Csikszentmihalyi's systems model of creativity (Image from Csikszentmihalyi 1999, 315).

‘Introduction’ in Rex E. Jung and Oshin Vartanian (eds), *The Cambridge Handbook of the Neuroscience of Creativity* (Cambridge University Press 2018) 1, 4; However, for a critique of this bipartite definition, and a call for the adoption of a tripartite definition with the additional criteria of ‘surprise’, see generally, Dean Keith Simonton, ‘Creative Ideas and the Creative Process: Good News and Bad News for the Neuroscience of Creativity’ in Rex E. Jung and Oshin Vartanian (eds), *The Cambridge Handbook of the Neuroscience of Creativity* (Cambridge University Press 2018) 9; For problems arising from the use of the standard definition for evaluations in different contexts, see generally, Acar et al, ‘Ingredients of Creativity’.

<sup>24</sup> As resumed by Simonton, ‘the creative *process* generates creative ideas, the creative *person* engages in the creative process producing those ideas, and the creative *product* contains the creative ideas that the creative person acquires through that creative process’ in Dean Keith Simonton, ‘Creative Ideas and the Creative Process: Good News and Bad News for the Neuroscience of Creativity’ in Rex E. Jung and Oshin Vartanian (eds), *The Cambridge Handbook of the Neuroscience of Creativity* (Cambridge University Press 2018) 9, 9.

<sup>25</sup> R. K. Sawyer, *Explaining Creativity: The Science of Human Innovation* (2<sup>nd</sup> edition, Oxford University Press 2012) 8-9.

<sup>26</sup> Regarding the emergent nature of creativity: see generally, R. K. Sawyer, *Explaining Creativity: The Science of Human Innovation* (2<sup>nd</sup> edition, Oxford University Press 2012).

<sup>27</sup> M. Csikszentmihalyi, ‘Society, Culture and Person: A Systems View of Creativity’, in R. Sternberg (ed) *The Nature of Creativity* (Cambridge University Press 1988) 325.

In this system, the ‘domain’ is a cultural component, that is, its construction derives from the accumulation of knowledge<sup>28</sup> from previous creative contributions.<sup>29</sup> It is from this reservoir that an individual will draw knowledge from and, driven by his personal traits and background,<sup>30</sup> try to produce variations of it, in order contribute to the existing repository with his own creative contribution. This capacity to generate a creative idea from existing knowledge (generativity), is part of the cognitive functions encompassed by creative thinking. In this process, the formulation of original ideas is accompanied by an evaluation of their usefulness, both of which are directed by their creator’s own perception of what is original and useful or not. Thus, this does not mean that after the individual has come up with a personally perceived creative idea (personal creativity), such idea will be considered to be creative as well by what will be referred to as the ‘field’ (consensual creativity).<sup>31</sup> The field is a social component represented by those who utilize their comprehension of the domain to evaluate the individual’s contribution as being original and useful, or not.<sup>32</sup> If the field vouches for the creativity of the individual’s contribution, it guarantees its establishment in the domain. If not, without social interest in it, ‘most novel ideas will be quickly forgotten’.<sup>33</sup> In the end, through this systematic interaction, the individual may engage in creative thinking utilizing the domain’s knowledge to formulate a creative product, in order to be subsequently judged by the field who, in turn, may stimulate his production by attributing him different types of rewards.<sup>34</sup>

With that being said, this emergent conception of creativity requires personal and consensual creativity assessments, which, by themselves, are thought of as not being able to fully describe creativity.<sup>35</sup> On one side, personal creativity allows one to pierce, namely through the neuroscientific study of creativity, into the cognitive mechanisms utilized by an individual when he is formulating and assessing what he thinks are creative ideas.<sup>36</sup> On the other hand, it may be the case, for example, that when evaluated by others, an idea fails to be recognized as being creative due to its brilliance, even though its creator did engage in creative thinking, possibly being recognized some time after. Another example may be that the individual himself does not engage in creative thinking, though due to his

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<sup>28</sup> Knowledge refers to all creative contributions accepted by the field, and there may be several specific domains and sub-domains of specific disciplines like mathematics or physics. M. Csikszentmihalyi, *Creativity: Flow and the Psychology of Discovery and Invention* (HarperCollins 1997) 27;

<sup>29</sup> It consists of ‘all of the created products that have been accepted by the field in the past’ in R. K. Sawyer, *Explaining Creativity: The Science of Human Innovation* (2<sup>nd</sup> edition, Oxford University Press 2012) 216.

<sup>30</sup> Janet Fulton and Elizabeth Paton, ‘The Systems Model of Creativity’ in Phillip McIntyre, Janet Fulton and Elizabeth Paton (eds) *The Creative System in Action. Understanding Cultural Production and Practice* (Palgrave Macmillan 2016) 27, 34.

<sup>31</sup> Making the distinction between personal and consensual creativity:

<sup>32</sup> Janet Fulton and Elizabeth Paton, ‘The Systems Model of Creativity’ in Phillip McIntyre, Janet Fulton and Elizabeth Paton (eds) *The Creative System in Action. Understanding Cultural Production and Practice* (Palgrave Macmillan 2016) 27, 39.

<sup>33</sup> M. Csikszentmihalyi, ‘Implications of a Systems Perspective for the Study of Creativity’ in R. Sternberg (ed) *Handbook of Creativity* (first published 1999, Cambridge University Press 2009), 313, 315.

<sup>34</sup> The field may attribute exclusive rights regarding the individual’s creation, as will be seen, attribute exclusive rights regarding the individual’s creation.

<sup>35</sup> Referring to the importance of both individualist and sociocultural definition, see generally, R. K. Sawyer, *Explaining Creativity: The Science of Human Innovation* (2<sup>nd</sup> edition, Oxford University Press 2012)

<sup>36</sup> Stating that the formation of a novel idea to an individual’s brain is the fundamental aspect of neuroscientific study. Margaret A. Boden, ‘Creativity as a Neuroscientific Mystery’ 3, 3 in Oshin Vartanian, Adam S. Bristol, and James C. Kaufman, *Neuroscience of Creativity* (MIT Press 2013); See also, Simonton, ‘Creative Ideas and the Creative Process’ 13-15.

greater knowledge on the matter than those evaluating his ideas', the neuroscientific observations will be misinterpreted as clarifying the functioning of creative thinking. It even may simply happen that those evaluating, sometimes composed by distinct groups (e.g. movie critics and the regular audience) do not come up with a consensus, whose mere averaging 'would suffer from prohibitively low reliability'.<sup>37</sup>

Admittedly, consensual evaluations may raise the question of who is fit to judge, bringing critiques of arbitrariness,<sup>38</sup> subjectivity,<sup>39</sup> and even the unrecognition of greatly creative individuals before they are long gone.<sup>40</sup> Nevertheless, even though self-perception is fundamental to creative thinking, its study also has issues,<sup>41</sup> such as deficient self-report (e.g. 'faking good'), and it is not sufficient to explain creativity in its entirety from a systematic point of view, as emerging from interconnected social and cultural phenomenon, and not merely individual.<sup>42</sup> Indeed, as will be seen, not only does creativity require creative thinking (which belongs to the individual component), but creative

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<sup>37</sup> Simonton, 'Creative Ideas and the Creative Process' 14.

<sup>38</sup> Analysing the reliability of experts, supervisors and self-reports to assess creativity, even though experts were considered to be the most 'objective', they were still considered to lack some of the advantages of self-reports, and posed questions such as 'Who can rightfully be considered experts of the domain?': Namgyoo K. Park, Monica Youngshin Chun, and Jinju Lee, 'Revisiting Individual Creativity Assessment: Triangulation in Subjective and Objective Assessment Methods' (2016) 28(1) *Creativity Research Journal* 1; This quoted question is taken from Kaufman's analysis on the idea type of expert for the creativity test of Consensual Assessment Technique (CAT), James C. Kaufman, and John Baer, 'Beyond New and Appropriate: Who Decides What Is Creative?' (2012) 24(1) *Creativity Research Journal* 83, 84.

<sup>39</sup> For example, the humor creativity of generating a comedic image may be evaluated by comedy professionals, amateurs, individuals with no experience, by the creator of the image, or by both. All of these evaluations are likely to have some different degree of subjectivity. See, e.g. Ori Amir, and Irving Biederman 'The Neural Correlates of Humor Creativity' 10 (597) *Frontiers in Human Neuroscience* 1; Dean Keith Simonton, 'Creative Ideas and the Creative Process: Good News and Bad News for the Neuroscience of Creativity' in Rex E. Jung and Oshin Vartanian (eds), *The Cambridge Handbook of the Neuroscience of Creativity* (Cambridge University Press 2018) 9, 13-15; Likewise, the imperfections of the famous Torrance Tests of Creative Thinking (TTCT) have been widely noted, and also improved upon, though their information remains a relevant insight into creativity. See generally, Robert J. Sternberg, 'Creative Giftedness Is Not Just What Creativity Tests Test: Implications of a Triangular Theory of Creativity for Understanding Creative Giftedness' (2018) 40(3) *Roeper Review* 158; For a general review: Kyung Hee Kim, 'Can We Trust Creativity Tests? A Review of the Torrance Tests of Creative Thinking (TTCT)' (2006) 18(1) *Creativity Research Journal* 3; Also, for example, regarding the problems derived from translation: Nükhet D. Yarbrough, 'Assessment of Creative Thinking Across Cultures Using the Torrance Tests of Creative Thinking (TTCT): Translation and Validity Issues' (2016) *Creativity Research Journal*, 28(2) 154; For an improvement: Sameh Said-Metwaly, Belén Fernández-Castilla, Eva Kyndt, and Wim Van den Noortgate, 'The Factor Structure of the Figural Torrance Tests of Creative Thinking: A Meta-Confirmatory Factor Analysis' (2018) 30(4) *Creativity Research Journal*, 352.

<sup>40</sup> As, for example, happened with Gregor Mendel who was far from being highly recognized during his time. As a critique of consensual evaluation for the study of neuroscience: Dean Keith Simonton, 'Creative Ideas and the Creative Process: Good News and Bad News for the Neuroscience of Creativity' in Rex E. Jung and Oshin Vartanian (eds), *The Cambridge Handbook of the Neuroscience of Creativity* (Cambridge University Press 2018) 9, 14;

<sup>41</sup> See generally, Paul J. Silvia, Benjamin Wigert, Roni Reiter-Palmon and James C. Kaufman, 'Assessing Creativity With Self-Report Scales: A Review and Empirical Evaluation' (2012) 54 *Psychology Faculty Publications* 1.

<sup>42</sup> The difficulty in achieving a balanced evaluation was already known by Guilford who, in 1950, stated: 'creative work that is to be realistic or accepted must be done under some degree of evaluative restraint. Too much restraint, of course, is fatal to the birth of new ideas. The selection of surviving ideas, however, requires some evaluation' in J.P. Guilford, 'Creativity' 453.

thinking is also shaped by the stimulation of the social context, the knowledge from the cultural field and the individual's personal background.

For these reasons, the employed notion of creativity will be based both on personal and consensual assessments in order to create a coherent<sup>43</sup> description of not only the brain's mechanisms underlying creative thinking in general<sup>44</sup> but also its integration in a sociocultural context. Thus, creativity encompasses not only the capacity to generate, from a domain of knowledge, useful and original ideas, as evaluated by their creative individual (personal creativity), but it also includes the capacity to generate creative ideas as evaluated by a field (consensual creativity).<sup>45</sup> Finally, creative thinking, which is a prerequisite for creativity, refers to the neurobiological process, encompassing distinct cognitive functions, which underlies the individual's effort to form original and useful ideas from a domain of knowledge. In conformity with a systems notion of creativity, it should be noted that creative thinking is likewise influenced by the social context, for example, when a scientific institution is granted funding, its scientists will be incentivized to engage in creative thinking.

With this being said, regarding the connection between creativity and intelligence, a clear answer as to how they overlap or mutually influence remains inconclusive.<sup>46</sup> Guilford's 'threshold' theory, posits that a high or above-average level of intelligence is required to achieve high levels of creativity, stating also that beyond 120 IQ points intelligence would not bear any other effect.<sup>47</sup> There has not been much certainty regarding these asserted thresholds in general,<sup>48</sup> and even though some studies point to their existence,<sup>49</sup> it must be understood that these are based on IQ results, whose ability to measure intelligence in

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<sup>43</sup> For a review of the existing incongruences in the neuroscientific study of creativity, see generally, Arne Dietrich and Riam Kanso, 'A Review of EEG, ERP, and Neuroimaging Studies of Creativity and Insight' (2010) 136(5) *Psychological Bulletin* 822.

<sup>44</sup> This is in accordance with Simonton's call for the focus on the neuroscientific study of creativity as primarily domain-generic, and not domain-specific, that is, related with specific domains of creativity, such as musical creativity, for example. See generally, D. K. Simonton, 'Domain-general creativity: On producing original, useful, and surprising combinations' in J. C. Kaufman, J. Baer, and V. P. Glăveanu (eds), *Cambridge handbook of creativity across different domains* (Cambridge University Press 2017) 41; In respect to the domain-generic mechanisms of creative thinking, see generally, Claudia Garcia-Vega and Vincent Walsh, 'Polymathy: The Resurrection of Renaissance Man and the Renaissance Brain' in Rex E. Jung and Oshin Vartanian (eds), *The Cambridge Handbook of the Neuroscience of Creativity* (Cambridge University Press 2018) 528.

<sup>45</sup> Akin to, though not equal, to the concepts of 'little-c' and 'Big-C' creativity. See generally, James C. Kaufman and Ronald A. Beghetto, 'Beyond Big and Little: The Four C Model of Creativity' (2009) 13(1) *Review of General Psychology* 1.

<sup>46</sup> Alan S. Kaufman, 'Many Pathways, One Destination. IQ Tests, Intelligent Testing, and the Continual Push for More Equitable Assessments' in Robert J. Sternberg (ed) *The Nature of Human Intelligence* 197, 203; Goldberg, *Creativity* 164.

<sup>47</sup> See generally, J. P. Guilford, *The Nature of Human Intelligence* (McGraw-Hill 1967).

<sup>48</sup> See for a general review of inconclusiveness, though finding correlation with their own results: Emanuel Jauk, Beate Dunst, Mathias Benedek and Aljoscha C. Neubauer, 'The relationship between intelligence and creativity: New support for the threshold hypothesis by means of empirical breakpoint detection' (2013) 41 *Intelligence* 212.

<sup>49</sup> See generally, Emanuel Jauk, Beate Dunst, Mathias Benedek and Aljoscha C. Neubauer, 'The relationship between intelligence and creativity: New support for the threshold hypothesis by means of empirical breakpoint detection' (2013) 41 *Intelligence* 212.

its entirety of cognitive functions is arguably limited.<sup>50</sup> Thus, the relation between these two concepts remains elusive.

The distinction between genius and talent has also been made since the mid-eighteenth century<sup>51</sup> when studies related to creativity (as encompassed by ‘genius’) begun to be made.<sup>52</sup> At the time, talent was considered to be built through education, and genius was seen as an untrainable spontaneous characteristic.<sup>53</sup> For example, Kant conceived genius as connected to one’s ‘nature’,<sup>54</sup> even though learned talent was still needed to shape it into an artistic work.<sup>55</sup> In addition, the development of both was seen as highly influenced by the involving environment,<sup>56</sup> as it would continue to be in modern research.<sup>57</sup>

From 1860 onwards, influenced by Darwinism’s fascination with the adaptation of species for survival,<sup>58</sup> Sir Francis Galton, set out to empirically measure the diversity and heredity of individual’s abilities,<sup>59</sup> namely their intelligence and creativity. At the time, this interest was greatly fuelled by the value of finding the ‘ablest race’<sup>60</sup> to expand a nation’s gifted individuals, which would allegedly play a crucial role in the future prosperity of countries.<sup>61</sup> Notwithstanding, through his studies, Galton gave evidence to the separation of genius from the supernatural,<sup>62</sup> and to the fact that ‘[g]enius, although

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<sup>50</sup> Alan S. Kaufman, ‘Many Pathways, One Destination. IQ Tests, Intelligent Testing, and the Continual Push for More Equitable Assessments’ in Robert J. Sternberg (ed) *The Nature of Human Intelligence* 197, 203; Goldberg, *Creativity* 164.

<sup>51</sup> Mark A. Runco, Robert S. Albert, ‘A history of research on creativity’ in R. J. Sternberg (Ed.), *Handbook of creativity* (Cambridge University Press 1998) 16-31.

<sup>52</sup> Runco and Albert, ‘A Historical View’ 7.

<sup>53</sup> William Duff, *An essay on Original Genius; and its Various Modes of Exertion in Philosophy and the Fine Arts particularly in Poetry* (Edward and Charles Dilly 1767) 19, 28.

<sup>54</sup> Douglas Burnham, *Immanuel Kant: Aesthetics*, Internet Encyclopedia of Philosophy <<https://www.iep.utm.edu/kantaest/#SH2d> > Accessed 20 December 2018.

<sup>55</sup> Thus, talent gave form to the material of genius: ‘genius can only furnish rich *material* for products of beautiful art; its execution and its *form* require talent cultivated in the schools, in order to make such a use of this material as will stand examination by the Judgement’. He likewise stated: “Although mechanical and beautiful art are very different, the first being a mere art of industry and learning and the second of genius, yet there is no beautiful art in which there is not a mechanical element that can be comprehended by rules and followed accordingly, and in which therefore there must be something *scholastic* as an essential condition” in Immanuel Kant, *The Critique of Judgment* (Macmillan 1914), 192-193 <http://oll.libertyfund.org/titles/1217> Accessed 23 June 2018.

<sup>56</sup> Such as the political environment and authoritative limitations. Paul Kaufman, *Essays in memory of Barrett Wendell* (Harvard University Press 1926) 191; Joseph Addison, ‘On Genius’ (1711), 160 *The Spectator*.

<sup>57</sup> Erez Reuveni, “Copyright, Neuroscience, and Creativity” (2013), 64(4) *Alabama Law Review* 735, 752

<sup>58</sup> Runco and Albert, ‘A history of research on creativity’ 7; H. L. Minton, ‘Charting life history: Lewis M. Terman’s study of the gifted’ in J. G. Morawski (Ed.), *The rise of experimentation in American psychology* (Yale University Press 1988) 138, 139.

<sup>59</sup> Francis Galton, *English men of science: Their nature and nurture* (MacMillan 1874); Francis Galton, *Inquires into human faculty* (MacMillan 1883).

<sup>60</sup> In his chapter XX, named ‘the comparative worth of different races’, Galton himself considers that the ‘ablest race’ was ‘unquestionably the ancient Greek’.

<sup>61</sup> Runco and Albert, ‘A Historical View’ (n1) 14.

<sup>62</sup> Mark A. Runco and Robert S. Albert, ‘Creativity Research. A Historical View’ in James C. Kaufman and Robert J. Sternberg, *The Cambridge Handbook of Creativity* (Cambridge University Press 2010) 12; Closer to Eastern views on creativity, as mentioned before. Fitzallen et al, *The Future of Educational Research*, 114.

exceptional, was a potential in every individual'.<sup>63</sup> These findings would lay the foundations of the 'democratic' notion of creativity which has been followed and built upon since then,<sup>64</sup> which states that 'everyone has creative potential'.<sup>65</sup> Such conception establishes a clear contrast with the previously held belief that creativity, which was associated with genius, was a capacity thought to exist in only a few gifted individuals.<sup>66</sup>

Indeed, biological studies regarding the existence of a particular gene or cortical anatomy (including the brain's overall or specific regions' size) which correlates with creative 'genius' have remained mostly speculative.<sup>67</sup> Even though the brains of famous creative individuals have been analyzed, the range of strange or ordinary features found is still inconclusive, namely if they are the cause of their creativity or a reflection of their creative lives.<sup>68</sup> The complicated relationship between certain genes and extraordinary cognitive ability has been explored since Galton's studies, from which it was that 'great mental capacity follows the law of organic transmission'.<sup>69</sup> However, such observation cannot be so strongly stated in the realm of creativity.<sup>70</sup> Even though some probable intervenient have proven to be hereditary, the cognitive complexity of creative thinking has maintained the study of possible genetic determinants of creativity, so far, indecisive.<sup>71</sup> Plus, what has been observed is that 'gifted' people achieve such status mostly<sup>72</sup> 'through dedicated training (...) that make it possible for them to do things that they otherwise could not'.<sup>73</sup> In truth, as will be further discussed, it is precisely due to the influence of environmental factors and developed personality traits that creative capacity must be, most of all, gained, and not merely inherited.<sup>74</sup>

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<sup>63</sup> Mark A. Runco and Robert S. Albert, 'Creativity Research. A Historical View' in James C. Kaufman and Robert J. Sternberg (eds), *The Cambridge Handbook of Creativity* (Cambridge University Press 2010) 12.

<sup>64</sup> See e.g. Mark A. Runco, 'Everyone has creative potential' in R. J. Sternberg, E. L. Grigorenko, and J. L. Singer (eds), *Creativity: From potential to realization* (American Psychological Association 2004) 21; Paul Torrance, 'The nature of creativity as manifest in its testing' (1988) in R. J. Sternberg (ed), *The nature of creativity* (Cambridge University Press 1988)

<sup>65</sup> Mark A. Runco, 'Education for Creative Potential' (2003) 47(3) *Scandinavian Journal of Educational Research* 317, 321.

<sup>66</sup> Margaret A. Boden, 'Creativity as a Neuroscientific Mystery' 3, 3 in Oshin Vartanian, Adam S. Bristol, and James C. Kaufman, *Neuroscience of Creativity* (MIT Press 2013).

<sup>67</sup> See e.g., in respect to Einstein's brain: Terence Hines, 'Neuromythology of Einstein's brain' (2014) 88 *Brain and Cognition* 21.

<sup>68</sup> Goldberg, *Creativity* 180.

<sup>69</sup> Francis Galton, *Hereditary Genius. An Inquiry into Its Laws and Consequences* (Barnes & Noble 2012, originally published in 1868) 4 – 5.

<sup>70</sup> In respect to creativity, 'today, the likely answer to this question is "sometimes and to some degree"'. Goldberg, *Creativity* 194.

<sup>71</sup> For a 2018 review, see generally, Zhaowen Liu, Jie Zhang, Xiaohua Xie, Edmund T. Rolls, Jiangzhou Sun, Kai Zhang, Zeyu Jiao, Qunlin Chen, Junying Zhang, Jiang Qiu, and Jianfeng Feng, 'Neural and genetic determinants of creativity' (2018) 174 *NeuroImage* 164.

<sup>72</sup> In some areas, such as sports, genetic physical traits become considerably more important. Nonetheless, when those have been endowed, practice becomes the distinguishing factor. See generally, Anders Ericsson and Robert Pool, *Peak: secrets from the new science of expertise* (Houghton Mifflin Harcourt 2016).

<sup>73</sup> Anders Ericsson and Robert Pool, *Peak: secrets from the new science of expertise* (Houghton Mifflin Harcourt 2016) 11.

<sup>74</sup> Goldberg, *Creativity* 195.

In the turn of the century, as Alfred Whitehead coins the term ‘creativity’ in the 1920s,<sup>75</sup> creativity becomes distinguished as an independent aspect of human cognition, and different tests for measuring it were devised.<sup>76</sup> Before, Catharine Coxe Miles’ IQ historiometric study of three hundred eminent men, pointed that ‘eminence’, albeit associated with elevated intellectual capacities, was highly influenced by persistence, character, and motivation.<sup>77</sup> Now, with the formulation of creativity as a separate cognitive ability and its independence from IQ measurements,<sup>78</sup> evidence accumulated towards the determinant importance of those same characteristics of resilience in creative thinking.<sup>79</sup> Indeed, several studies compared the traits of incredibly creative people and the population’s average,<sup>80</sup> from which it was clear that ‘for all their differences, the most influential factors were developmental and family differences’.<sup>81</sup> Graham Wallas realized that such characteristics could be comprehended and taught.<sup>82</sup> This idea dissipates creativity’s relation with the belief that it relied mostly on one’s nature or that it was untrainable. It also bears great importance, especially for the potential residing in the education of creative thinking and its dissemination,<sup>83</sup> whose importance shall be explored hereafter.

## 2.2. *Homo creativus*: the importance of being creative

In the book ‘On the Origin of Species’, Charles Darwin pointed to the importance of species’ capability to become adapted to their environment’s variability in order to survive.<sup>84</sup> In this regard, *homo sapiens*’ remarkable competence at creative thinking has been a prime contributor in guaranteeing their survival.<sup>85</sup> Surrounded by specialized predators, *sapiens*’ ancestors of the *homo* genus had to adapt their food regime to the natural events that shaped their environment. They managed to create useful tools, artistic

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<sup>75</sup> Arthur Still, Mark d’Inverno, ‘A History of Creativity for Future AI Research’ (2016) Proceedings of the Seventh International Conference on Computational Creativity 147, 151.

<sup>76</sup> Kaufman, *Creativity 101*, 11.

<sup>77</sup> Catharine Cox Miles, *Genetic studies of genius: Vol.2. The early mental traits of three hundred geniuses* (Stanford University Press 1926) 218.

<sup>78</sup> For a critique respecting the conception of IQ tests as a general measurement of intelligence or their source of variance as based on cognitive differences, see generally, Ken Richardson, ‘What IQ Tests Test’ (2002) 12(3) *Theory & Psychology* 283.

<sup>79</sup> For an extensive review, see generally, T. Amabile and J. Pillemer, ‘Perspectives on the social psychology of creativity’ 46 *Journal of Creative Behavior* 3; Also, in respect to the importance of motivational persistence, Dean Keith Simonton, ‘Creative Ideas and the Creative Process: Good News and Bad News for the Neuroscience of Creativity’ in Rex E. Jung and Oshin Vartanian (eds), *The Cambridge Handbook of the Neuroscience of Creativity* (Cambridge University Press 2018) 9, 16.

<sup>80</sup> E.g. Frank Barron ‘The disposition toward originality’ (1955) 51 *Journal of Abnormal and Social Psychology* 478; Donald W. MacKinnon, ‘The personality correlates of creativity: A study of American architects’ in Philip E. Vernon (Ed.), *Creativity* (Penguin 1970).

<sup>81</sup> Runco and Albert, ‘A Historical View’ (n1) 15.

<sup>82</sup> Fitzallen et al, *The Future of Educational Research*, 115.

<sup>83</sup> ‘Other important findings from social psychology are that creative habits can be learned, and that our day-to-day environment influences creative behaviors’ in Claudia Garcia-Vega and Vincent Walsh, ‘Polymathy: The Resurrection of Renaissance Man and the Renaissance Brain’ in Rex E. Jung and Oshin Vartanian (eds), *The Cambridge Handbook of the Neuroscience of Creativity* (Cambridge University Press 2018) 528, 532.

<sup>84</sup> Charles Darwin, *On the Origin of Species by Means of Natural Selection or the Preservation of Favoured Races in the Struggle for Life* (ElecBook 1997, originally published in 1859) 17-18.

<sup>85</sup> See generally, Agustín Fuentes, *The Creative Spark. How Imagination Made Humans Exceptional* (Dutton 2017).



ornaments, cooperated and shared knowledge across generations.<sup>86</sup> Importantly, these creations and collaboration granted increasing survival capacities which led to their further evolution.<sup>87</sup> Eventually, together with language, those initial creative capabilities would be greatly expanded in *homo sapiens*,<sup>88</sup> which turned them into fearsome hunters, outclassing the stronger physical attributes of other animals, and even their related species. In the end, from hunting with lethal innovations to eating diversely cooked preys while sharing ancestral stories, creativity has been at the center of humanity's development and propelled it into the modern world where it may be needed more than ever.

Indeed, looking back at past millennia, the exponential rate at which technological progress has been recently developing becomes evident,<sup>89</sup> and with it so too have emerged unprecedented challenges to be confronted by *homo sapiens*' creativity. Contrastingly, in previous centuries, Egyptian, Roman or Chinese civilizations were mostly ruled by a set of skills which had been continuously passed down by previous generations to younger ones, so children could survive by doing what their parents did and, most likely, in the same way.<sup>90</sup> However, as knowledge accumulation accelerates,<sup>91</sup> abrupt cultural shifts<sup>92</sup> occur more frequently and lead to shorter periods of cultural stability and the faster decay of current skills' utility. From a historical perspective, since the first agricultural revolution, humanity has seen increasingly briefer timeframes between culturally destabilizing transformations,<sup>93</sup> with the industrial and the digital revolution being separated merely by two hundred years. It is now far less likely for parents to be able to teach, or even predict, what future competencies will be required from their children, and themselves.<sup>94</sup> This means that whatever one has learned and practiced so far during life, may not be capable of sustaining the rest of it. Not only is there a more frequent need to modernize what one can do, but there is also progressively less time to do it.<sup>95</sup>

Concretely, the predicted rate of work automation means that more people will need to adapt and partake in creative activities, which are, for now, harder to automate.<sup>96</sup> Such

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<sup>86</sup> See generally, Mark Lake, 'Homo: the creative genus?' in Steven Mithen (ed), *Creativity in Human Evolution and PreHistory* (Routledge 1998) 91; Agustín Fuentes, *The Creative Spark. How Imagination Made Humans Exceptional* (Dutton 2017) 40-55.

<sup>87</sup> Agustín Fuentes, *The Creative Spark. How Imagination Made Humans Exceptional* (Dutton 2017) 42-45.

<sup>88</sup> See generally, Steven Mithen, 'A creative explosion? Theory of mind, language and the disembodied mind of the Upper Palaeolithic' in Steven Mithen (ed), *Creativity in Human Evolution and PreHistory* (Routledge 1998) 120.

<sup>89</sup> Goldberg, *Creativity* 2; G. E. Moore, 'Cramming more components onto integrated circuits' (1998) 86 Proceedings of the IEEE 82; Martin Hilbert, Priscila López, 'The World's Technological Capacity to Store, Communicate, and Computer Information' (2011) 332 (6025) Science 60.

<sup>90</sup> Yuval Noah Harari, *21 Lessons for the 21<sup>st</sup> Century* (Jonathan Cape 2018) 208; Goldberg, *Creativity* 2.

<sup>91</sup> See generally, Ray Kurzweil, 'The Law of Accelerating Returns' (2007) <http://www.kurzweilai.net/the-law-of-accelerating-returns> Accessed 25 June 2018.

<sup>92</sup> See generally, P. Jenkins, *The Great and Holy War: How World War I became a religious crusade* (Harper One 2015).

<sup>93</sup> Goldberg, *Creativity* 5.

<sup>94</sup> Yuval Noah Harari, *21 Lessons for the 21<sup>st</sup> Century* (Jonathan Cape 2018) 209.

<sup>95</sup> About this reality and how to tackle it, see generally, John Spencer, '7 ways to inspire divergent thinking in the classroom' (March 25 2018), *Medium* <https://goo.gl/6JLXAk> Accessed 25 June 2018.

<sup>96</sup> Michael Chui, James Manyika, and Mehdi Miremadi, "Where machines could replace humans—and where they can't (yet)?" (2016), McKinsey Quarterly.

pervasiveness of technology and its trend of increasingly complex functionalities<sup>97</sup> will require workers to continually ‘upgrade’ themselves as the machines they operate do it too, in fear of becoming equally obsolete. Also, with the existing ‘convergence trend’,<sup>98</sup> where traditionally separated concepts and working fields are united to form new challenges and solutions (e.g. Law and Technology),<sup>99</sup> so too does the need for creative multidisciplinary approaches and competences increase.<sup>100</sup> As a result, there will likely be a growing division between those who will be able to adjust and prosper in these future circumstances, and those who will be overwhelmed by this rate of change, with their abilities’ application decaying, and becoming increasingly maladapted to their surrounding reality.<sup>101</sup>

In the face of such uncertainty, creative thinking becomes a valuable tool which allows one to adapt and generate novel and useful solutions to unforeseen problems. Creativity grants not only the intellectual flexibility to adjust to new scenarios, but it also gives the capacity to produce innovations out of creative ideas, which may then be given to others or introduced in the market, enabling society to implement them.<sup>102</sup> Hence, creativity allows one to find a way of bringing a desired state of things to reality, not only to one’s life but also to society, and ‘breeds both hope and benefits from hope because it provides a way to realize that hope’.<sup>103</sup>

Fortunately, as mentioned before, two of the great findings of modern studies on creativity was the realization that all individuals were potentially capable of it and that it could be taught, contrary to what was previously believed. For this reason, it is crucial for individuals to develop this capacity so they are capable of facing the upcoming fundamental shifts in their daily lives.<sup>104</sup> For some, the changes brought by the ‘information society’, where survival in today’s connected world becomes governed by

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<sup>97</sup> See generally: Giovanni Emanuele Corazza, Alessandro Vanelli-Coralli, and Raffaella Pedone, ‘Technology as a Need: Trends in the Evolving Information Society’ (2010) 1(1) *Advances in Electronics and Telecommunications* 128.

<sup>98</sup> Giovanni Emanuele Corazza, Alessandro Vanelli-Coralli, and Raffaella Pedone, ‘Technology as a Need: Trends in the Evolving Information Society’ (2010) 1(1) *Advances in Electronics and Telecommunications* 131.

<sup>99</sup> The rise of the law and technology realm, in reference to the fact that the legal services are being shaped by technology, which lawyers will eventually have to understand. See generally, Mark McKamey *Legal Technology ‘Artificial Intelligence and the Future of Law Practice’* (2017) 22 *Appeal Law Journal* 45; Or, more profoundly, the fusion between the physical and the digital realm, through Virtual or Augmented reality, for example. Goldberg, *Creativity* 4, 7-9.

<sup>100</sup> Neri Oxman, ‘Age of Entanglement’ (2016) 1 *Design and Science* < <https://jods.mitpress.mit.edu/pub/AgeOfEntanglement> > Accessed 5 January 2018.

<sup>101</sup> Referred as the ‘psychological divide’ in Giovanni Emanuele Corazza, Alessandro Vanelli-Coralli, and Raffaella Pedone, ‘Technology as a Need: Trends in the Evolving Information Society’ (2010) 1(1) *Advances in Electronics and Telecommunications* 131-132.

<sup>102</sup> Selcuk Acar, Cyndi Burnett and John F. Cabra, ‘Ingredients of Creativity: Originality and More’ (2017) 29 (2) *Creativity Research Journal* 133, 133.

<sup>103</sup> Seana Moran, ‘The Roles of Creativity in Society’ 76.

<sup>104</sup> However, analysing the USA decrease in Torrance’s tests of creative thinking, from 1966 until 2008: Kyung Hee Kim, ‘The Creativity Crisis: The Decrease in Creative Thinking Scores on the Torrance Tests of Creative Thinking’ 23(4) *Creativity Research Journal*, 285.

the speed, technology and intangibility of information,<sup>105</sup> will make creativity the ‘prime skill and talent for all human beings.’<sup>106</sup> With the incredible quantity of knowledge that has become available in modern society, it will be essential to learn how to navigate, criticize, and learn to think beyond it, in a creative way.<sup>107</sup> If students are able to access so much knowledge on the Internet, ‘what can universities teach students that they can’t look up on Google?’<sup>108</sup>

In truth, the world’s connectivity and capacity to share information also represents a boon for the spreading of creative ideas and worldwide implementation of innovative solutions, which multiply the potential benefits that a single creative idea may have. It also permits the awareness of other’s needs, in conjunction with their conception as a possible aid in achieving similar objectives, which may lead to more efficient efforts.<sup>109</sup> Consequently, although humanity will be greatly challenged by rapid technological and societal transformations, it will also have at its disposal an unparalleled capacity to impart individuals with creative thinking and to foster innovation, so it may overcome them.

However, such utilization of humanity’s creative potential is not guaranteed. The development of creative thinking will require not only its incentive and dissemination,<sup>110</sup> for example, through education,<sup>111</sup> but will also need to be free from restrictions, establishing an environment where creative thinking may thrive. As will be further explored, copyright regimes can influence creative thinking both by incentivizing it and also by restricting its development. Therefore, if creativity is to play such a crucial role in the future,<sup>112</sup> its reliance on copyright should be understood, in order to configure a relationship which permits creative thinking to be as disseminated and developed as needed to surmount humanity’s plethora of incoming challenges. However, the analysis of copyright’s influence on creative thinking first requires the comprehension of how the latter functions. Thus, as a complex cognitive process, it seems fundamental to first grasp the neurobiological foundations of creative thinking, as advanced by the study of the neuroscience of creativity, to then conceptualize how copyright may influence these mechanisms.

## Chapter Conclusion

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<sup>105</sup> About the concept of ‘information society’, see generally: Giovanni Emanuele Corazza, Alessandro Vanelli-Coralli, and Raffaella Pedone, ‘Technology as a Need: Trends in the Evolving Information Society’ (2010) 1(1) *Advances in Electronics and Telecommunications* 124.

<sup>106</sup> Giovanni Emanuele Corazza, ‘Potential Originality and Effectiveness: The Dynamic Definition of Creativity’ (2016) 28(3) *Creativity Research Journal*, 258, 258.

<sup>107</sup> Yuval Noah Harari, *21 Lessons for the 21<sup>st</sup> Century* (Jonathan Cape 2018) 20-210.

<sup>108</sup> Claudia Garcia-Vega and Vincent Walsh, ‘Polymathy: The Resurrection of Renaissance Man and the Renaissance Brain’ in Rex E. Jung and Oshin Vartanian (eds), *The Cambridge Handbook of the Neuroscience of Creativity* (Cambridge University Press 2018) 534.

<sup>109</sup> Giovanni Emanuele Corazza, Alessandro Vanelli-Coralli, and Raffaella Pedone, ‘Technology as a Need: Trends in the Evolving Information Society’ (2010) 1(1) *Advances in Electronics and Telecommunications* 130.

<sup>110</sup> This novelty abundant environment will require major changes in society’s cognitive habits. Goldberg, *Creativity* 5-7.

<sup>111</sup> S. Moran, ‘Creativity in school. In K. S. Littleton’ in C. Wood, J. K. Staarman (eds), *International handbook of educational psychology: New perspective on learning and teaching*. (Emerald 2010).

<sup>112</sup> Seana Moran, ‘The Roles of Creativity in Society’ in James Kaufman, Robert Sternberg (eds) *The Cambridge Handbook of Creativity* (Cambridge University Press 2010) 75.

In this introduction to creativity, its evolutionary importance set the stage for the realization of how critical its development will become in the future. Fortunately, the mystical conceptions surrounding the notion of creativity have begun to disappear as its study continues to advance. Based on it, a systems notion of creativity was presented and it was proposed that its development relies on the interaction between an individual, a field, and domain. Likewise, creativity's connection with the supernatural was contradicted and constructed instead as being a potential in every individual, not reserved to a specially gifted elite. As the need for creativity becomes ever more pressing, these assumptions about its nature will be tested in the following chapter as creativity is analyzed under the light of neuroscience. Hopefully, this will grant a more detailed picture of creativity, in order to further assess how copyright terms of protection may be aligned with development.

## Chapter 3 - How is creative thinking developed?

Having conceptualized what creativity is, it was also justified how important its development has been for humanity, and why it will most likely continue to be. For this reason, it is crucial to understand creative thinking since it is prerequisite for creativity. Through this neuroscientific overview, several determinant aspects of creative thinking will be exposed so that the construction of terms of copyright may be guided by them.

### 3.1. The Neuroscience of Creativity: how creative thinking is developed

In 1837, George Washington Bethune talked about the capacity of geniuses to ‘store away ideas for future combinations’.<sup>113</sup> A century later,<sup>114</sup> Stein affirmed that creativity ‘arises from a reintegration of already existing materials or knowledge, but when it is completed it contains elements that are new’.<sup>115</sup> Following this, the neuroscientific study of creativity has supported the notion that creative thoughts is built upon the foundations laid by previous knowledge.<sup>116</sup>As stated by the neuroscientist Joaquin Fuster, ‘in human creativity there is no future without a past’.<sup>117</sup>

Such assertion goes in line with the historical remark that mastery of one’s field has been ever-present in great creative minds,<sup>118</sup> In fact, research on expertise in creative fields has demonstrated the fundamental necessity of ‘studying the masters’ in order to ‘rival’ and, possibly, emulate them.<sup>119</sup> Likewise, several studies<sup>120</sup> have correlated professional training with distinct brain activity which lead to increased levels of creativity when compared with those of novices. In conjunction, these point to the idea that by studying what has been said before, one becomes more capable of thinking what is yet to be thought.

Therefore, it will be the purpose of the following sub-chapters to try to understand how

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<sup>113</sup> George Washington Bethune, *Genius: An address delivered before the literary societies of Union College* (G. W. Mentz & Son 1837) 21.

<sup>114</sup> Galton also supported the notion that ‘ideas in the conscious mind are linked to those in the unconscious mind by threads of similarity

<sup>115</sup> Stein, ‘Creativity and culture’ 311.

<sup>116</sup> Even unusual savant creative work relies on great memory capacity and the repetition-to-creation process. See generally, Darold A. Treffert, ‘The savant syndrome: an extraordinary condition. A synopsis: past, present, future’ (2009) 364(1522) *Philos. Trans. R. Soc. Lond. B. Biol. Sci.* 1351; R. Keith Sawyer, *Explaining creativity. The Science of Human Innovation* (Oxford University Press 2006) 21, 113-173; Joaquín M. Fuster, *The Prefrontal Cortex* (5th Edition Elsevier 2015) 415, 415-417.

<sup>117</sup> Fuster, *The Prefrontal Cortex* 415.

<sup>118</sup> Sawyer, *Explaining Creativity* 18; John R. Hayes, ‘Cognitive Processes in Creativity’ 135 in John A. Glover, Royce R. Ronning, Cecil R. Reynolds (eds.), *Handbook of Creativity* (Springer 1989); See generally, Dean Keith Simonton, ‘Creative Development as Acquired Expertise: Theoretical Issues and an Empirical Test’ (2000) 20 *Developmental Review* 283.

<sup>119</sup> For example, in chess, ‘[r]esearch has shown that the amount of time spent in this sort of analysis—is not the amount of time spent playing chess with others—is the single most important predictor of a chess player’s ability. Anders Ericsson and Robert Pool, *Peak: secrets from the new science of expertise* (Houghton Mifflin Harcourt 2016) 44.

<sup>120</sup> See e.g., Ori Amir, and Irving Biederman ‘The Neural Correlates of Humor Creativity’ 10 (597) *Frontiers in Human Neuroscience* 1; Also, Yasuyuki Kowatari, Seung Hee Lee, Hiromi Yamamura, Yusuke Nagamori, Pierre Levy, Shigeru Yamane and Miyuki Yamamoto, ‘Neural Networks Involved in Artistic Creativity’ (2009) 30 *Human Brain Mapping* 1678, 1688.

the brain utilizes this acquired knowledge to achieve novel ideas. Nevertheless, it must first be explored how and where it stores this obtained knowledge, so it can be subsequently retrieved and manipulated to forge creative works.

### 3.1.1. Short-term and long-term memory: receiving and storing information

The storage of knowledge structurally depends on a vast and complex neural network.<sup>121</sup> The brain possesses around 86 billion neurons,<sup>122</sup> most of which receive information through their dendrites, process it, and convey it through an axon via a total of around 150 trillion chemical and electrical synapses.<sup>123</sup> The brain's network is also divided in the brain by the right and the left hemispheres which are anatomically and, as will be seen, functionally different. Both hemispheres are linked by an in-between structure called corpus callosum which allows information to be transmitted from one to the other and its global management.<sup>124</sup>

The brain's neural network possesses 'small-world network'<sup>125</sup> properties, which means that it has not only highly clustered local neural nodes but, at the same time, it is optimized to the point that even distant nodes are still able to connect through a 'relatively small number of steps',<sup>126</sup> namely due to neural 'hubs' to which several connections are made and, from there, distributed throughout further nodes. This grants the brain the capacity to receive and integrate information from various separate regions in its cognitive functioning. Likewise, it is possible for 'the' brain's all-encompassing neural network, to include different sub-networks for specific tasks with all still being highly interconnected.<sup>127</sup> In addition, as will be better seen, this structure will allow a group of neurons from separate brain regions to be efficiently connected to form a memory.

Based on this neural architecture, there are two important stages for information to be acquired and readily available for creative transformation: the input and storage of information. The responsibility of giving information about the surrounding world to the

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<sup>121</sup> In 2010, 'by comparison, there [were] somewhere on the order of 40 billion pages on the Internet. If you assume an average of ten links per page, that means you and I are walking around with a high-density network in our skulls that is orders of magnitude larger than the entirety of the World Wide Web'. Steven Johnson, *Where Good Ideas Come From. The Natural History of Innovation* (Riverhead Books 2010) 46.

<sup>122</sup> Frederico A. C. Azevedo, Ludmila R.B. Carvalho, Lea T. Grinberg, José Marcelo Farfel, Renata E.L. Ferretti, Renata E.P. Leite, Wilson Jacob Filho, Roberto Lent and Suzana Herculano-Houzel 'Equal Numbers of Neuronal and Nonneuronal Cells Make the Human Brain an Isometrically Scaled-Up Primate Brain' (2009) 513 *The Journal of Comparative Neurology* 532, 535; Suzana Herculano-Houzel, 'The human brain in numbers: a linearly scaled-up primate brain' (2009) 3 *Front Hum Neurosci.* 31, 41.

<sup>123</sup> Bente Pakkenberg, Dorte Pelviga, Lisbeth Marnera, Mads J. Bundgaard, Hans Jørgen G. Gundersenb, Jens R. Nyengaardb and Lisbeth Regeura, 'Aging and the human neocortex' (2003) 38 *Experimental Gerontology* 95, 95; Thai Nguyen, 'Total Number of Synapses in the Adult Human Neocortex' (2010) 3(1) *Undergraduate Journal of Mathematical Modeling: One + Two* 9.

<sup>124</sup> Alexandre Castro Caldas, *Criatividade: a função cerebral improvável* (Universidade Católica Editora 2017) 10.

<sup>125</sup> 'a small-world network is defined to be a network where the typical distance L between two randomly chosen nodes (the number of steps required) grows proportionally to the logarithm of the number of nodes N in the network'. For an additional mathematical and visual representation of these characteristics see < [https://en.wikipedia.org/wiki/Small-world\\_network](https://en.wikipedia.org/wiki/Small-world_network) >; Also, see generally, Duncan J. Watts & Steven H. Strogatz, 'Collective dynamics of 'small-world' networks' (1998) 393 *Nature* 440.

<sup>126</sup> Goldberg, *Creativity* 130-132.

<sup>127</sup> Goldberg, *Creativity* 130-132.

brain falls upon the neurons in the parietal, occipital and temporal lobes of the cerebrum, which are devoted primarily to such perception, with all sensory primary cortices residing in them.<sup>128</sup> Afterwards, as information rushes in through one's senses it is going to be further processed by heteromodal association cortex named PTO<sup>129</sup> since it is based on the confluence between these three lobes. The PTO is responsible for organizing elementary information incoming from multiple unimodal sensory areas (regarding only one sense)<sup>130</sup> or from polymodal cortices, and further assemble and assimilate<sup>131</sup> it into more intricate aggregations (therefrom association cortex).<sup>132</sup> This assemblage of primary information into more complete constructs permits 'multimodal sensory images', which occur, for example, when one thinks about an apple: its shape, colour, smell, the sound made when it is bitten, are all imagined.<sup>133</sup> For this reason, the PTO is important for recognition of 'faces, objects or voices'.<sup>134</sup>

With information having been received and packaged, it is now ready to be stored throughout the three mentioned cerebrum lobes.<sup>135</sup> For this task, two important systems are utilized: short-term memory (STM) and long-term memory (LTM). The former consists of the retention and availability of small amounts of information to one's thought (most recent numbers point to three - five<sup>136</sup> 'meaningful items'<sup>137</sup>) for a brief period of time.<sup>138</sup> On the other hand, LTM allows the storage of enormous amounts of information over lengthy periods of time,<sup>139</sup> although most of it remains, at any given moment, absent from one's consciousness, capable nonetheless of being partially retrieved. Markedly, this type of memory stores not only elementary bits of information, but also complex concepts and associated patterns of knowledge acquired through one's learning, so-called

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<sup>128</sup> Arne Dietrich, 'The cognitive neuroscience of creativity' (2004) 11(6) *Psychonomic Bulletin & Review*, 1011, 1012.

<sup>129</sup> *Encyclopedia of Clinical Neuropsychology* (Springer 2011) 269

<sup>130</sup> Donnelly K., 'Heteromodal Cortex' *Encyclopedia of Clinical Neuropsychology* 1244.

<sup>131</sup> Peter F.C. Gilbert, 'An outline of brain function' (2001) 12 *Cognitive Brain Research* 61; Dietrich, 'The cognitive neuroscience of creativity' 1012.

<sup>132</sup> *Encyclopedia of Clinical Neuropsychology* 268.

<sup>133</sup> *Id* 1244.

<sup>134</sup> *Ibid*

<sup>135</sup> Dietrich, 'The cognitive neuroscience of creativity' 1016.

<sup>136</sup> Nelson Cowan, 'The Magical Mystery Four: How is Working Memory Capacity Limited, and Why?' 19(1) *Curr Dir Psychol Sci.* 2010 51, 51; The original study by Miller pointed to seven. George A. Miller, 'The Magical Number Seven, Plus or Minus Two Some Limits on Our Capacity for Processing Information' 10(2) *Psychological Review* 343, 349, With some variance between people and through one's life span. Nelson Cowan, *Working Memory Capacity* (Psychology Press 2005) 208.

<sup>137</sup> For better comprehension of the concept see generally *e.g.* Cowan, 'The Magical Mystery Four'; Miller, 'The Magical Number Seven'.

<sup>138</sup> Alan Baddeley, Michael W. Eysenck and Michael C. Anderson, *Memory* (2nd Edition, Psychology Press 2014) 41-61.

<sup>139</sup> Baddeley et al, *Memory* 13-15.

‘schemas’.<sup>140</sup> Via repetition,<sup>141</sup> in time,<sup>142</sup> STM may be consolidated<sup>143</sup> into LTM.<sup>144</sup>

However, both systems function in neurophysiologically different ways.<sup>145</sup> Concretely, during the repetition process,<sup>146</sup> the consolidation of LTM not only leads to stronger connectivity among firing neurons due to changes in the concentration of neurotransmitters in their synapses, but it also grows completely new synaptic terminals between them.<sup>147</sup> This growth of synaptic terminals depends on the synthesis of proteins not required for the formation of STM where such event does not occur, while synapses in STM suffer only functional changes in which they are strengthened or weakened, but no new ones are created.<sup>148</sup> Such anatomical formation is what allows long-term memories to subsist, to the point that these will disappear in case the former atrophies.<sup>149</sup> However, in contrast with computational memory, as long as these synaptic connections are maintained through recollection, the brain’s storing capacity seems to have almost no boundaries.<sup>150</sup>

These observations establish a fundamental understanding in the modern neurobiological study of memory: that ‘the individual connection between two neurons is an elementary

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<sup>140</sup> John Sweller, *Instructional Design in Technical Areas* (Australian Council for Educational Research 1999) 11.

<sup>141</sup> Already in 1885, Herman Ebbinghaus determined that ‘the memorisation not only requires more time taken by itself, because each repetition lasts longer, but it also requires more time relatively because an increased number of repetitions becomes necessary. Six verses of a poem require for learning not only three times as much time as two but considerably more than that.’ Herman Ebbinghaus, *Memory. A contribution to Experimental Psychology* (translated by Henry A. Ruger and Clara E. Bussenius, Teachers college, Columbia university 1913) 46.

<sup>142</sup> Originally considered by G. E. Müller and A. Pilzecker, *Experimentelle Beiträge zur Lehre vom Gedächtniss* (Verlag von Johann Ambrosius Barth 1900).

<sup>143</sup> To be noted, it may take from days to years: From days to years. Jan Born and Ines Wilhelm, ‘System consolidation of memory during sleep’ (2012).

<sup>144</sup> See generally about the process memory consolidation, Hilde A. Lechner, Larry R. Squire, and John H. Byrne, ‘100 Years of Consolidation - Remembering Müller and Pilzecker’ (1999) 6 *Learning & Memory* 67.

<sup>145</sup> Carr, *The Shallows* 110-113.

<sup>146</sup> Kandel, *In Search of Memory* 234.

<sup>147</sup> To be specific, synaptic consolidation may happen at a local level or throughout different brain regions. The first, only explains the consolidation of what are called ‘implicit memories’ which are those that are ‘recalled directly through performance, without any conscious effort or even awareness that we are drawing on memory’, like dribbling a basketball. The storage of more complex, ‘explicit’ (or declarative) memories, comprising facts and abstract concepts that one consciously remembers, requires ‘system consolidation’, which slowly cements representations of temporary memories and increases their underlying connectivity throughout several involved neocortical regions; This distinction was made back in 1980 by Cohen NJ and Squire LR, ‘Preserved learning and retention of pattern-analyzing skill in amnesia: dissociation of knowing how and knowing that’ (1980) 210(4466) *Science* 207; Kandel, *In Search of Memory* 234; Carr, *The Shallows* 113; About the process of ‘system consolidation’: L. R. Squire, S. Zola-Morgan, ‘The medial temporal lobe memory system’ (1991) 253(5026) *Science* 1380; Also, Jan Born and Ines Wilhelm, ‘System consolidation of memory during sleep’ (2012) 76 *Psychological Research* (2012) 192, 193; Larry R. Squire and Pablo Alvarez, ‘Retrograde Amnesia and Memory Consolidation: A Neurobiological Perspective,’ *Current Opinion in Neurobiology*, 5 (1995): 169–77;.

<sup>148</sup> See generally, Louis B. Flexner, Josefa B. Flexner and Richard B. Roberts, ‘Memory in Mice Analyzed with Antibiotics’ (1967) 155(3768) *Science* 1377; Kandel, *In Search of Memory* 220.

<sup>149</sup> Kandel, *In Search of Memory* 196 -197.

<sup>150</sup> Cowan, *Working Memory Capacity* 1; Torkel Klingberg, *The Overflowing Brain: Information Overload and the Limits of Working Memory* (translated by Neil Betteridge Oxford University Press, 2009), 36.



unit of memory storage'.<sup>151</sup> In STM, the information embedded in such connection is briefly kept in WM<sup>152</sup> through the mutual excitation of networks of pyramidal neurons<sup>153</sup> continuously triggering regardless of on-going sensory stimulation,<sup>154</sup> which results in it being kept briefly in working memory. In LTM, it is the growth of synaptic connections through consolidation that forms the basic foundations on which information is preserved in the long-term.<sup>155</sup> Thus, memories are organically carved into the brain's neural network,<sup>156</sup> each with its pattern of interconnected neurons, and it will be the connection between these neural webs, teeming with consolidated information, that will permit the construction of novel ideas. In fact, as will be seen, the concept of old knowledge being the 'clay' from which creative ideas are shaped may be understood as a quite literal biological phenomenon. Truthfully, creative ideas are precisely originated from the shaping of existing neural networks (containing old knowledge) into a newly interconnected network (which underlies the creative idea).

Remarkably, the consolidation of knowledge and creation of such networks does not seem to limit the brain's 'processing power', but instead strengthens the capacity to learn and assimilate future skills and ideas.<sup>157</sup> This supports the positive feedback-loop through which learning leads to increased easiness in not only mastering the learned field but also in comprehending others and formulating still unseen connections.<sup>158</sup> Such phenomenon also applies to creative skills, which not only again reinforces the idea of greatly creative individuals spending a great part of their career studying 'what has been said', but it also points to an explanation of the distinguishable incidence of polymathy in the most creative people.<sup>159</sup> Hence, it may yet be, that an age where humanity has their creativity constantly challenged, may become the 'Age of the Polymath'.<sup>160</sup>

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<sup>151</sup> Larry Squire and Eric Kandel, *Memory: From mind to molecules* (Scientific American Library 1999) 29.

<sup>152</sup> Arnsten et al., 'A New Form of Neuroplasticity' 366.

<sup>153</sup> A class of neurons abundant in the dorsolateral prefrontal cortex (DLPFC), which possess long apical dendrites, multiple basal dendrites and an extremely lengthy and branched axon, which results in several synaptic contacts along it, making pyramidal neurons exceptionally fitted to assemble vast quantities and types of information. Nelson Spruston, 'Pyramidal neurons: dendritic structure and synaptic integration' (2008) 9 *Nature Reviews Neuroscience* 206, 206.

<sup>154</sup> See generally, Goldman-Rakic, 'Cellular basis of working memory' (1995) 14 *Neuron* 477; Also, Amy F.T. Arnsten, Min J. Wang, and Constantinos D. Paspalas 'Neuromodulation of Thought: Flexibilities and Vulnerabilities in Prefrontal Cortical Network Synapses' (2012) 76(1) *Neuron* 223, 224.

<sup>155</sup> A prediction already made in 1894 by Ramón y Cajal in 'La fine structure des centres nerveux'; Eric R. Kandel, 'The Molecular Biology of Memory Storage: A Dialog Between Genes and Synapses' (2000) 21(5) *Bioscience Reports* 565, 573.

<sup>156</sup> A prediction already made in 1894 by Ramón y Cajal in 'La fine structure des centres nerveux'; Eric R. Kandel, 'The Molecular Biology of Memory Storage: A Dialog Between Genes and Synapses' (2000) 21(5) *Bioscience Reports* 565, 573.

<sup>157</sup> Sheila E. Crowell, 'The Neurobiology of Declarative Memory' in John H. Schumann, Shelia E. Crowell, Nancy E. Jones, Namhee Lee, Sara Ann Schuchert and Lee Alexandra Wood, *The Neurobiology of Learning: Perspectives from Second Language Acquisition* (Lawrence Erlbaum 2004) 76.

<sup>158</sup> See generally, Claudia Garcia-Vega and Vincent Walsh, 'Polymathy: The Resurrection of Renaissance Man and the Renaissance Brain' in Rex E. Jung and Oshin Vartanian (eds), *The Cambridge Handbook of the Neuroscience of Creativity* (Cambridge University Press 2018) 528.

<sup>159</sup> R. Root-Bernstein, 'The art of innovation: Polymaths and universality of the creative process' in L.V. Shavinina (ed), *The international handbook of innovation* (Oxford University Press 2003) 267, 267.

<sup>160</sup> Claudia Garcia-Vega and Vincent Walsh, 'Polymathy: The Resurrection of Renaissance Man and the Renaissance Brain' in Rex E. Jung and Oshin Vartanian (eds), *The Cambridge Handbook of the Neuroscience of Creativity* (Cambridge University Press 2018) 528, 534.

Also, it should be noted that the processes of consolidation and retrieval of memory are not perfect engravings and recollections of the originally perceived information. On the contrary, they are both affected by one's emotional state and subsequent experiences,<sup>161</sup> which not only affects what is selected to be registered but also constantly updates the content of memories. New information shapes past information and vice-versa. Plus, human brains are not video cameras but are instead selective about what is encoded.<sup>162</sup> In creative thinking, such influences may possibly shape an author's knowledge so much that he genuinely (or willingly) forgets that his work was borrowed from someone else's.<sup>163</sup>

With this being said, it was clarified how knowledge is received through the sensory areas and aggregated by the PTO cortex, while STM and LTM store it in neural networks throughout the brain and make it available to conscious thought. With acquired knowledge set in place, it is time to begin its transmutation.

### 3.1.2. Generativity: transmuted knowledge into creative ideas

At the beginning of this chapter, an idea was put forward: that creative ideas emerge from the combination of previously acquired knowledge. The capacity to do so is called generativity, and it underlies the general ability to utilize old mental representations to formulate new ones which lie at the heart of humans' distinguishing cognitive abilities.<sup>164</sup> Notably, generativity boundaries are almost limitless, as the prospecting of what is (un)known<sup>165</sup> may not only result in predictions and decisions about the future, but it may also construct realities never to come.<sup>166</sup> For example, human language, for which the PFC is responsible,<sup>167</sup> stands as a clear demonstration of humans' capacity for generativity and as an insight into the neuroscientific process of creativity. With it, one can rearrange learned singular signs or sounds into a nearly infinite number of combinations, being capable of not only describing and communicating human experiences but also of constructing the most abstract intricacies of existence or

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<sup>161</sup> See generally, Donna J. Bridge and Joel L. Voss 'Active retrieval facilitates across-episode binding by modulating the content of memory' (2014) 63 *Neuropsychologia* 154; Donna J. Bridge, Joan Y. Chiao, and Ken A. Paller 'Emotional context at learning systematically biases memory for facial information' (2010) 38(2) *Memory & Cognition* 125.

<sup>162</sup> See generally, Marla Paul, 'How your memory rewrites the past' (February 04, 2014 *Northwestern Now*) < <https://news.northwestern.edu/stories/2014/02/how-your-memory-rewrites-the-past> > Accessed 15 November 2018; Also, Franziska R. Richter, and Nick Yeung, 'ERP Correlates of Encoding Success and Encoding Selectivity in Attention Switching' (2016) 11(12) *PLOS ONE* < <https://doi.org/10.1371/journal.pone.0167396> > Accessed 20 December 2018.

<sup>163</sup> 'Not unfrequently, the ideas of their favourites become so incorporated with their own, that they know them not to be otherwise than original (...) Thus, Milton could hardly have been aware that the epithets "most musical, most melancholy," which he applies to the nightingale, are almost an exact translation of the Poet of Salamis, whom he loved so much' in George Washington Bethune, *Genius: An address delivered before the literary societies of Union College* (G. W. Mentz & Son 1837) 21.

<sup>164</sup> Goldberg, *Creativity* 46.

<sup>165</sup> "terra incognita" Daniel J. Boorstin said, are "the most promising words ever written on the maps of human knowledge". *Discoverers* page xvi.

<sup>166</sup> It is a defining feature of humans, which excel at it when compared with any other species. Goldberg, 'Creativity' 46.

<sup>167</sup> John D. E. Gabrieli, Russell A. Poldrack, and John E. Desmond, 'The role of left prefrontal cortex in language and memory' (1998) 95 *Proc. Natl. Acad. Sci.* 906, 912.

impossible imaginary scenarios.<sup>168</sup>

Likewise, it is presumed that generativity was at the centre of modern humans' ability<sup>169</sup> to create unprecedented tools, art and fictional constructs<sup>170</sup> between 70,000 and 30,000 years ago,<sup>171</sup> driving them to shape reality as they imagined it. Indeed, it was this capacity that, 40,000 years ago, led prehistoric humans, inspired by the environment around them but not constrained by the shackles of the physical world, to imagine further and carve from woolly mammoth ivory, a sculpture bearing the figure of a human body with the head of a lion.<sup>172</sup> Named Löwenmensch ('lion-person'),<sup>173</sup> this figure is a testimony of humans' extraordinary ability to generate from two familiar realities, something that transcends them.

To better comprehend the neural mechanisms behind this proficiency in reconfiguring knowledge, one must apprehend a particular system crucial in human thought: working memory (WM).<sup>174</sup> This mechanism, which is thought to be based on a dense network that connects the prefrontal cortex (PFC)<sup>175</sup> with the remaining specialized regions of the cerebrum,<sup>176</sup> serving as an 'interface between perception, long-term memory and action'.<sup>177</sup> First, working memory is responsible for temporarily maintaining information 'online' in consciousness<sup>178</sup> and, therefore, creates 'our immediate conscious

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<sup>168</sup> 'It is infinitely flexible and (almost) universally present. It is by far the most complex behaviour we know of'. Morten H. Christiansen and Simon Kirby, 'Language Evolution: The Hardest Problem in Science?' p.15 in Morten H. Christiansen and Simon Kirby (eds.) *Language Evolution* (Oxford University Press 2003); Yuval Noah Harari, *A Brief History of Humankind* (Harvill Secker 2014) 17; Goldberg, 'Creativity' 47.

<sup>169</sup> It may even be the result of a distinguishing genetic mutation between *homo sapiens* and *homo sapiens sapiens*. Goldberg, 'Creativity' 50.

<sup>170</sup> Such as "'law", "state", "corporation", and "religion"' in Goldberg, 'Creativity' 49.

<sup>171</sup> Harari, *A Brief History of Humankind* 20-21.

<sup>172</sup> Though much has been said about the anthropomorphic interpretation of the sculpture, particularly around its gender, which seems to not be a settled discussion. See, Lionman Foundation, 'The Lion Man. A Telling Bone' <https://www.lowenmensch.org/wp-content/uploads/2017/05/LionMan-PDF.pdf> Accessed 17 August 2018.

<sup>173</sup> Found in Hohlenstein-Stadel, Germany, 1939. With it, instruments of lyrical music were also found. See, Lionman Foundation, 'The Lion Man. A Telling Bone' <https://www.lowenmensch.org/wp-content/uploads/2017/05/LionMan-PDF.pdf> Accessed 17 August 2018.

<sup>174</sup> First introduced by George A. Miller, Eugene Galanter and Karl H. Pribram, *Plans and the Structure of Behavior* (Holt, Rinehart and Winston 1960).

<sup>175</sup> Which comprises almost half of the frontal lobe and was the last region of the neocortex to develop in the history of human biologic evolution, continuing to mature well into one's thirties. Besides, its development in humans is clearly demarcated when compared with other species, including great apes. Elkhonon Goldberg, *Creativity: The Human Brain in the Age of Innovation* (Oxford University Press 2018) 46.

<sup>176</sup> See generally, M. D'Esposito, M., 'From cognitive to neural models of working memory' (2008) 362(1481) *Philosophical Transactions of the Royal Society of London Series B* 761; Also, Lawrence H. Sweet, and Beth A. Jerskey, 'Working memory' in Jeffrey S. Kreutzer John DeLuca Bruce Caplan (eds), *Encyclopedia of Clinical Neuropsychology* (Springer 2<sup>nd</sup> edition 2018) 3753.

<sup>177</sup> Baddeley, 'Working Memory' (n 28) 829; Working memory's capacity to manage and manipulate information contributes to the fundamental continuity and interaction between past experiences, present decisions and actions, and predictions of the future. Goldman-Racik 'Cellular Basis of Working Memory' 483.

<sup>178</sup> Nicholas Carr, *The Shallows. What the Internet is Doing to Our Brains* (W. W. Norton & Company 2010) 69.

experience of the here and now'.<sup>179</sup> Three components contribute to this brief retention of information. On one hand, the 'phonological loop' stores information regarding language and sound, while the 'visuo-spatial sketchpad' retains visual and spatial content.<sup>180</sup> On the other, the 'episodic buffer'<sup>181</sup> is responsible for temporarily holding these types of STM and bind them into combined complex representations, including their integration with information from LTM.<sup>182</sup> Finally, with this access to information, its fourth component, the 'central executive', has a supervisory role,<sup>183</sup> through which WM permits one to subjectively<sup>184</sup> direct attention, filter and evaluate information based on their relevance for the cognitive task at hand (task-relevant information), to then coordinate its execution.<sup>185</sup>

In resume, working memory permits one to relate task-relevant STM and LTM inputs to then formulate an appropriate solution to a specific problem. This focus and integration of information is not only essential for analytical associative tasks, where its importance has been substantially confirmed,<sup>186</sup> but it is thought to also influence creativity. Although there is debate regarding its role in creative thinking,<sup>187</sup> WM's capacity to retain

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<sup>179</sup> Arne Dietrich, 'The cognitive neuroscience of creativity' (2004) 11(6) *Psychonomic Bulletin & Review*, 1011, 1013.

<sup>180</sup> Lawrence H. Sweet, and Beth A. Jerskey, 'Working memory' in Jeffrey S. Kreutzer John DeLuca Bruce Caplan (eds), *Encyclopedia of Clinical Neuropsychology* (Springer 2<sup>nd</sup> edition 2018) 3753.

<sup>181</sup> See generally, Alan Baddeley, 'The episodic buffer: a new component of working memory?' (2000) 4(11) *Trends in Cognitive Sciences* 417.

<sup>182</sup> Notably, this relationship with long-term memory is reciprocal since working memory is not only at the receiving end but also serves as an input to the creation of those long-term storage sites, for example, through the recollection of memories, which permit the maintenance of their consolidation in LTM. See, Goldman-Racik 'Cellular Basis of Working Memory' 477; Carr, *The Shallows* 69; As found true for primates in L.D. Selemon and P. S.Goldman-Rakic, 'Common Cortical and Subcortical Targets of the Dorsolateral Prefrontal and Posterior Parietal Cortices in the Rhesus Monkey: Evidence for a Distributed Neural Network Subserving Spatially Guided Behavior' (1988) 8 (11) *Journal of Neuroscience* 4049, 4049; Also generally agreed to happen in humans too, albeit comprising a substantially more complex processing of information. Fuster, *The Prefrontal Cortex* 415-416.

<sup>183</sup> See generally, P. Sauseng, W. Klimesch, M. Schabus, and M. Doppelmayr, 'Fronto-parietal EEG coherence in theta and upper alpha reflect central executive functions of working memory' (2005) 57(2) *International Journal of Psychophysiology* 97.

<sup>184</sup> 'Rather than by an explicit, externally imposed instruction'. Goldber, *Creativity* 72.

<sup>185</sup> Lawrence H. Sweet, and Beth A. Jerskey, 'Working memory' in Jeffrey S. Kreutzer John DeLuca Bruce Caplan (eds), *Encyclopedia of Clinical Neuropsychology* (Springer 2<sup>nd</sup> edition 2018) 3753; Alan Baddeley, 'Working Memory: Looking back and Looking forward' *Nature Reviews Neuroscience* (2003) 4 829, 836; Akira Miyake and Priti Shah (eds.), *Models of Working Memory. Mechanisms of Active Maintenance and Executive Control* (Cambridge University Press 1999) 1; Alan D. Baddeley and Graham Hitch, 'Working memory' in G. H. Bower (Ed.), *The psychology of learning and motivation: Advances in research and theory* (New York: Academic Press 1974) vol 8, 47-89.

<sup>186</sup> M. Aisling Murray and Ruth M. J. Byrne, 'Attention and working memory in insight problem-solving' 2005 in *Proceedings of the Twenty-Seventh Annual Conference of the Cognitive Science Society*.

<sup>187</sup> For example, finding no relation between WM and creative insight problems, and considering insight problems as not being exclusively of a divergent nature: Maria M. Hedblom, 'The Role of Working Memory in Creative Insight: Correlation analysis of working memory capacity, creative insight and divergent thinking' (2013) < <https://goo.gl/mCkGhW> > Accessed 10 January 2019; Instead, supporting that WM correlates with creative insight, which is of convergent and divergent thinking nature: Margaret E. Webb, Daniel R. Little, Simon J. Cropper and Kayla Roze 'the contributions of convergent thinking, divergent thinking, and schizotypy to solving insight and noninsight problems'(2017) 23(3) *Thinking & Reasoning* 235; Promoting a dual-pathway model, where WM has a different relation in divergent thinking tasks, with persistent thinking vs flexible thinking, and concluding that WM affected creative insight and persistent thinking but not flexibility: C. K. De Dreu, B. A. Nijstad, M. Baas, I. Wolsink and M. Roskes,

information in one's consciousness and its ability for assessing the appropriateness of new ideas (convergent thinking),<sup>188</sup> makes it a prerequisite for creative thinking.<sup>189</sup> However, it is also thought to be particularly important in conscious and focused creative problem solving, versus unconscious associative solutions,<sup>190</sup> both of which will be discussed hereafter.

Aided by working memory's toolkit, generativity's combinatorial process needs solely to 'kick in'. One way to initiate the assembly of creative ideas is through the brain's engagement of two thinking abilities: convergent and divergent thinking.<sup>191</sup> Initially, when trying to solve a problem, one consciously engages in convergent thinking and utilizes mostly the left hemisphere to search for logical, obvious and familiar answers.<sup>192</sup> However, if it does not find them, the right hemisphere engages in a process called 'divergent thinking', through which the brain formulates several loose associations between concepts and categories of information which lead to the formation of different ideas. At this point, the neural networks of the right hemisphere, comprising longer and more branched dendrites than the left,<sup>193</sup> broadly scan<sup>194</sup> through a wider range of accessible information (namely derived from LTM) and try to formulate several original alternatives of potentially useful material.<sup>195</sup> While this happens, the left hemisphere is directing attention to task-relevant information and filtering what is irrelevant.<sup>196</sup> At some point, previously unconnected disparate information becomes neurally linked, neurons fire, an activation pattern arises, a new idea is born and presented to one's working memory to assess its usefulness. To be remembered, the emerging neural interconnection is the organic embodiment of that idea.<sup>197</sup> As mentioned above, such creative idea, if then

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'Working memory benefits creative insight, musical improvisation, and original ideation through maintained task-focused attention' (2012) 38 *Personality and Social Psychology Bulletin* 656; On the opposite, regarding motor creativity, concluding that WM did not affect persistent thinking but flexible thinking: Alexander Morarua, Daniel Memmert, and John van der Kamp, 'Motor creativity: the roles of attention breadth and working memory in a divergent doing task' 28(7) *Journal of Cognitive Psychology*, 856, 857; To be noted, the concept of 'insight' is sometimes not interchangeable: sometimes it relates to a type of creative solution (, other times it relates to creative solving in general.

<sup>188</sup> See generally Liane Gabora, 'Revenge of the 'neurds': Characterizing creative thoughts in terms of the structure and dynamics of memory' (2010) 1(22) *Creativity Research Journal* 1; Also, Margaret E. Webb, Daniel R. Little, Simon J. Cropper and Kayla Roze 'the contributions of convergent thinking, divergent thinking, and schizotypy to solving insight and noninsight problems'(2017) 23(3) *Thinking & Reasoning* 235, 239-240

<sup>189</sup> See generally, A. R. Damasio, 'Some notes on brain, imagination and creativity' in K. H. Pfenninger, and V. R. Shubik (eds) *The origins of creativity* (Oxford: Oxford University Press 2001) 59.

<sup>190</sup> Claire M. Zedelius and Jonathan Schooler, 'Mind Wandering "Ahas" versus Mindful Reasoning: Alternative Routes to Creative Solutions' (2015) 6(834) *Frontiers in Psychology*1; Carsten K. W. De Dreu, Bernard A. Nijstad, Matthijs Baas, Inge Wolsink, and Marieke Roskes, 'Working memory benefits creative insight, musical improvisation, and original ideation through maintained task-focused attention' (2012) 5(28): *Personality and Social Psychology Bulletin*, 656.

<sup>191</sup> Introduced by Guilford, 1956. JP Guilford, 'The structure of intellect' (1956) 53(4) *Psychol Bull.* 267.

<sup>192</sup> Daniel Kahneman, *Thinking Fast and Slow* (Farrar, Straus and Giroux (2011) 69.

<sup>193</sup> Jonah Lehrer, 'The Eureka Hunt' *The New Yorker* (July 28 2008) 40, 43.

<sup>194</sup> The searching process carried by the right-hemisphere is less strict and permits looser associations to be made. In this case, concentration and wandering do not mutually exclude but are both essential. 'We must concentrate, but we must concentrate on letting the mind wander'. Lehrer, 'The Eureka Hunt' 43.

<sup>195</sup> See generally, Roger E. Beaty, Mathias Benedek, Paul J. Silvia, and Daniel L. Schacter, 'Creative Cognition and Brain Network Dynamics' (2016) 20(2) *Trends in Cognitive Sciences*, February 87.

<sup>196</sup> Reuveni, 'Copyright, Neuroscience, and Creativity' 749.

<sup>197</sup> Lehrer, 'The Eureka Hunt' 43.

consolidated in LTM, will only last as long as that neural connection remains. In truth, a creative idea can be simply described as ‘a specific constellation of neurons fir[ing] in sync with each other for the first time in your brain’.<sup>198</sup>

Nevertheless, there may be times when such a systematic and selective process may not achieve the desired creative results. In that case, the ineffable spark of eureka may be triggered by a process called ‘mind-wandering’.<sup>199</sup> Such state is characterized by the independent generation of internal thoughts, usually decoupled from ‘current perceptual surroundings’.<sup>200</sup> This mind-wandering may be task related or unrelated, which means that it can either be guided by a specific purpose, or it may be an almost unaware, spontaneous, inner-focused moment, the consciousness of which may surprise the one experiencing it.<sup>201</sup> However, left with no guidance, this drifting will hardly produce a creative idea. This is where a previous state of hyperfrontality (a moment of task-focused brain activity) will be useful to help the opposite hypofrontal,<sup>202</sup> usually unregulated state of mind-wandering.<sup>203</sup> Thus, continuous preparatory work, built through a persistent effort, for example, of studying, and seeking out answers, will ‘anchor’ the now ‘directed wandering’<sup>204</sup> process.

To achieve a creative idea in this manner, there is an initial state of task-specific hyperfrontality, in which answers are pursued throughout diverse regions of the brain, particularly through the PTO, which may give a vague feeling of being close, though not yet able to ‘connect the dots’. Nevertheless, this effort is not in vain, as the neural activation left behind will subsequently direct the unconscious mind-wandering process. As it takes place, such wandering roams through pathways between previously activated, albeit unconnected, neural nodes and eventually links them to form a ‘single interconnected network’, then presented to consciousness as a new idea which will, hopefully, be considered as what it had been searching for.<sup>205</sup> The hypofrontal dissociated state in which one usually is when this process occurs may lead to the typical eureka sensation, of an idea having appeared ‘out of nowhere’, since there is usually little awareness at the moment of wandering. Poincare described such an occurrence:

‘One evening, contrary to my custom, I drank black coffee and could not sleep. Ideas rose in crowds; I felt them collide until pairs interlocked, so to speak, making a stable combination. By the next morning I had established the existence

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<sup>198</sup> Johnson, *Where Good Ideas Come From* 45-46; See generally, Matias J. Ison, Rodrigo Quian Quiroga, Itzhak Fried, ‘Rapid Encoding of New Memories by Individual Neurons in the Human Brain’ (2015) 87 (1) *Neuron*.

<sup>199</sup> See generally, Cornelia McCormick, Clive R. Rosenthal, Thomas D. Miller and Eleanor A. Maguire, ‘Mind-Wandering in People with Hippocampal Damage’ (2018) 38(11) *Journal of Neuroscience* 38 (11) 2745.

<sup>200</sup> Cornelia McCormick, Clive R. Rosenthal, Thomas D. Miller and Eleanor A. Maguire, ‘Mind-Wandering in People with Hippocampal Damage’ (2018) 38(11) *Journal of Neuroscience* 38 (11) 2745, 2745.

<sup>201</sup> For a detailed comparison, see generally, Paul Seli, Evan F. Risko, Daniel Smilek, and Daniel L. Schacter, ‘Mind-Wandering with and Without Intention’ (2016) 20(8) *Trends Cogn Sci*. August 605.

<sup>202</sup> States of hypofrontality are associated with sleeping or meditation. Some psychiatric disorders like severe depression are also related with such a state. A. Dietrich, ‘Transient Hypofrontality as a Mechanism for the Psychological Effects of Exercise’ (2006) 145 *Psychiatry Research* 79; Goldberg, *Creativity* 122.

<sup>203</sup> Goldberg, *Creativity* 122.

<sup>204</sup> Goldberg, *Creativity* 133.

<sup>205</sup> Goldberg, *Creativity* 133.

of a class of Fuchsian functions, those which come out from the hypergeometric series; I had only to write out the results, which took but a few hours.<sup>206</sup>

Arrived at this point, a general sketch of the creative thinking process may be drawn. From the input of information through one's senses to its assembly, distribution and storage by STM and LTM sites, obtained knowledge becomes organically carved in the brain's neural network, waiting to be shaped anew. As a creative challenge arises, if one is not only armed with the executive and manipulative mechanisms of working memory, but also with the focus of strenuous hyperfrontal effort, then the gates need only be open. By virtue of divergent thinking or mind-wandering, the brain will be directed via alluring and separate reservoirs of knowledge. Out of this, a connected neural pathway is forged, and an idea emerges in consciousness.

Finally, aware of creative thinking's neuroscientific underpinnings, it may be affirmed that creative ideas do indeed ultimately derive from the transfiguration of formerly obtained knowledge, which is stored in the brain's neural network through the processes of STM and LTM. This seems to be true even when creative ideas appear to have 'come from nowhere', whose feeling has been expressed by several eminently creative people. Understanding the workings of mind-wandering allows one to support that such surprising creativity is likely the consequence of the unaware state of hypofrontality from which mind-wandering derives. In fact, those eureka moments do come from somewhere, namely two factors: the knowledge that one possesses and his ability to generate a creative idea from it. Thus, the affirmation that a novel and useful idea could come from a vacuum diminishes the consideration of its two intervenients: first, of the sources of knowledge from which the idea was composed, and second, of the author himself who disregards his own effort.

Starting by this aspect of the author's self neglectation, it appears to be clear that there is no need for such rejection, which is even accompanied sometimes with its association with the supernatural.<sup>207</sup> Truthfully, as seen, the process of mind-wandering relies on the direction given by the author's prior effort of consciously solving the problem, without which it would simply be a mindless roam through memory. Contrary to computers, the human brain cannot align all the available information and begin a sequence of associative connections. Thus, this process has to be considerably more optimized by previous moments of hyperfrontality, followed by states of hypofrontality, and once again of hyperfrontality, namely to evaluate and validate the emerging creative idea.<sup>208</sup> Considering that this process may go on for years without the desired solution, the mentioned idea that persistence is one of the most related traits with creative thinking capacity becomes evident. However, it is also possible that failure is related to what information one has available to solve the creative problem.

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<sup>206</sup> Henri Poincare, *The Value of Science. Essential Writings of Henri Poincare* (Random House 2001) 220.

<sup>207</sup> '[I]f that condition of mind and soul, which we call inspiration, lasted long without intermission, no artist could survive it. The strings would break and the instrument be shattered into fragments. It is already a great thing if the main ideas and general outline of the work come without any racking of the brains, as the result of that supernatural inexplicable force we call inspiration' in Modest Ilyich Tchaikovsky, *The Life & Letters of Peter Ilich Tchaikovsky* (University Press of the Pacific 2004) 275.

<sup>208</sup> Goldberg, *Creativity* 134.

It was seen that knowledge does not spontaneously become consolidated in the brain's neural network without a source of input, much less in LTM, through which a repetitive process must occur. Since STM possesses such a limited capacity to hold information (in terms of time and amount), if one wants to have a robust repository of knowledge from which to draw creative ideas from, it is simply not possible to rely on the inspiration of recent sensory input. Particularly regarding complex creative tasks, frequent revision is the only way to guarantee that knowledge is stored for long-term and that it is maintained there.

Fortunately, this prolonged effort seems to greatly compensate. First, not only does one obtain a richer neural network, but it also becomes easier to obtain more knowledge, as the understanding of posterior ideas and skills, even in other fields, has been shown to be facilitated.<sup>209</sup> In creative thinking, this is in part explained by the presented domain-generic processes of creativity, which permit the mastery of one's creative field to strengthen creative mechanisms that will also be utilized by other 'distinct' fields.<sup>210</sup> Finally, the very use of the acquired instruction is optimized, as those who master their fields 'learn' (conscious or unconsciously) to better utilize their brains for more creative results, as different neural activity and even anatomical changes shown to be derived from proficiency.<sup>211</sup> These characteristics form a positive feedback-loop regarding one's capacity to learn and to think creatively, pointing also to the mentioned observation that greatly creative individuals usually master their fields, in addition to many equally being proficient in more than one field. Lastly, these exponential returns obtained from one's instruction,<sup>212</sup> partly explain why great creativity must be 'gained', while vouching once again for the importance of education (namely of creative thinking), of one's perseverance in studying, and in preparation for creative insights.

Therefore, the fact that the author's creative ideas arise from past knowledge does not diminish his importance as a crucial component of creativity. In fact, not only are novel ideas 'neural constellations', but they are also akin to those observed in the night sky, where a conglomerate of singular brilliant works and authors is linked in a particular pattern to form an encompassing creative idea. Such is the sociocultural nature of

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<sup>209</sup> Sheila E. Crowell, 'The Neurobiology of Declarative Memory' in John H. Schumann, Shelia E. Crowell, Nancy E. Jones, Namhee Lee, Sara Ann Schuchert and Lee Alexandra Wood, *The Neurobiology of Learning: Perspectives from Second Language Acquisition* (Lawrence Erlbaum 2004) 76.

<sup>210</sup> See generally, Claudia Garcia-Vega and Vincent Walsh, 'Polymathy: The Resurrection of Renaissance Man and the Renaissance Brain' in Rex E. Jung and Oshin Vartanian (eds), *The Cambridge Handbook of the Neuroscience of Creativity* (Cambridge University Press 2018).

<sup>211</sup> Regarding e.g. language proficiency, see generally, S. Reiterer, E. Pereda, and J. Bhattacharya, 'Measuring second language proficiency with EEG synchronization: How functional cortical networks and hemispheric involvement differ as a function of proficiency in second language speakers' (2009) 25(1) *Second Language Researcher* 77; Also, for music: A. L. Berkowitz, *The improvising mind: Cognition and creativity in the musical moment* (Oxford University Press 2010).

<sup>212</sup> It should be noted that cognitively stimulating environments 'foster the growth of new neurons in the form of neurogenesis', contrary to the past view that neurons did not grow in adulthood. See generally, J. Brown, CM. Cooper-Kuhn, G. Kemperman, H. van Praag, J. Winkler, FH. Gage, 'Enriched environment and physical activity stimulate hippocampal but not olfactory bulb neurogenesis' (2003) 17 *European Journal of Neuroscience* 2042.



creativity, and subsequently, of scientific,<sup>213</sup> cultural<sup>214</sup> and even cognitive evolution,<sup>215</sup> which asserts for every author: that his works are distinct from others but likewise composed of them, that his personality is carried in his creations though accompanied by those of inspiring peers, and that his contributions may be as grand as stars while being as infimum as dots in the universal picture of creative developments.

However, up until now, the access to the sources from which knowledge is acquired has been taken for granted, and the factors that permit or restrict one to acquire it have not yet been explored. Naturally, access to information is a condition *sine qua non* for creative thinking.<sup>216</sup> Moreover, the ability to develop creative ideas is ‘entirely a function of the scope of these neural networks and the diversity of information housed in each individual node’<sup>217</sup>. Indeed, the quantitative and qualitative aspects of information sources should not be underestimated: <sup>218</sup> not only is it important the amount of knowledge one has, but its diversity is also fundamental. As an example, regarding his discovery of Special Relativity, particularly to the opposition of the absolute character of time, Einstein openly stated:

‘The type of critical reasoning required for the discovery of this central point was decisively furthered, in my case, especially by the reading of David Hume’s and Ernst Mach’s philosophical writings’.<sup>219</sup>

Such account demonstrates how access to certain pieces of knowledge may have a substantial impact in the completion of impending creative ideas. Thus, ‘[c]reativity is a product of both the brain’s internal cognitive architecture of creativity and that architecture’s interaction with the external environment’.<sup>220</sup> The access to knowledge, mostly dictated by external factors,<sup>221</sup> influences its availability in one’s neural network which, in turn, determines one’s capacity for generativity.

Knowledge accessibility has another important influence on creative thinking by shaping intrinsic motivation.<sup>222</sup> In general, unless forced upon, motivation seems to be a requirement for most creative thinking. Specifically, intrinsic motivation relates to the

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<sup>213</sup> See generally, David Zeigler, ‘Evolution and the Cumulative Nature of Science’ *Evo Edu Outreach* (2012) 585.

<sup>214</sup> See generally, Giancarlo Frosio, *Reconciling Copyright with Cumulative Creativity, The Third Paradigm* (Edward Elgar Publishing Limited 2018).

<sup>215</sup> ‘Indeed, the benefits are so substantial that even small “initial increments” in this direction are expected to generate powerful biocultural feedback leading to further brain and cognitive evolution’ in Dietrich Stout and Erin E. Hecht, ‘Evolutionary neuroscience of cumulative culture’ 114(30) *PNAS* 7861, 7861, citing Steven Pinker, ‘The cognitive niche: Coevolution of intelligence, sociality, and language’ (2010) 107 *PNAS* 8993, 8995; Robert Boyd, Peter J. Richerson and Joseph Henrich, ‘The cultural niche: Why social learning is essential for human adaptation’ (2011) 108 *PNAS* 10918.

<sup>216</sup> Dietrich, ‘The cognitive neuroscience of creativity’ 1020.

<sup>217</sup> Erez Reuveni, ‘Copyright, Neuroscience, and Creativity’ (2013) 64 *Alabama Law Review* 735, 748.

<sup>218</sup> Daniel Kahneman, *Thinking Fast and Slow* (Farrar, Straus and Giroux (2011) 77.

<sup>219</sup> Albert Einstein, *Autobiographical Notes* (Court Pub Co 1949, trans. and ed. P. A. Schilpp) 51.

<sup>220</sup> Erez Reuveni, ‘Copyright, Neuroscience, and Creativity’ (2013) 64 *Alabama Law Review* 735, 748.

<sup>221</sup> Naturally, individuals devoid of senses, due to biological internal conditions, are likewise affected in their capacity to access information.

<sup>222</sup> For a neuroscientific explanation of this process, see generally, See generally, Stefano I. Di Domenico and Richard M. Ryan ‘The Emerging Neuroscience of Intrinsic Motivation: A New Frontier in Self-Determination Research’ (2017) 11(145) *Frontiers in Human Neuroscience* 1.

spontaneous desire to seek creative challenges ‘to extend and exercise one’s capacity, to explore, and to learn’,<sup>223</sup> not for the fear of punishment or the desire to obtain a reward, but for the inherent satisfaction of pursuing such activity.<sup>224</sup> Research has shown that intrinsic motivation for such creative exploration depends on the relation between the creative problem’s novelty and one’s level of knowledge in relation to it. If the creative endeavor is too novel or unknown in relation to one’s knowledge, that will lead to anxiety towards it, while too little novelty results in one’s boredom.<sup>225</sup> If an optimal relation exists between the two, interest and excitement towards a creative challenge prevail over states of anxiety and boredom, thus promoting the search for and solution to such challenges.<sup>226</sup> On the other hand, if knowledge is scarce or individuals are not faced with creative challenges, anxiety or boredom will negatively impact creative thinking. Thus, this influencing aspect on creative thinking ends up equally converging on the importance of accessing knowledge: to make sure not only that individuals are not afraid of tackling creative problems, but also that they have enough instruction to be incentivized to face them.

## Chapter Conclusion

In an effort to better guide terms of copyright protection towards the development of creativity, this chapter was dedicated to comprehending how creativity is neurobiologically produced. Looking to test the proposed systems notion of creativity and the idea that creative thinking would also depend on sociocultural aspects, this chapter begun with the proposal that creativity relies on the formulation of creative ideas from past knowledge. The subsequent delving into creativity’s neurobiological mechanics ended up supporting such notion. It was seen that as one receives inputs of knowledge and stores them in the neural networks of STM and LTM, the subsequent processes of divergent thinking, mind-wandering and convergent thinking permit the bounding of existing networks (containing acquired knowledge) into a new interconnected pattern of neurons which underly the new creative idea. This confirmation strongly demonstrates how creativity is fundamentally based on acquired knowledge, whose importance is extended to the capacity of accessing it since its access is a prerequisite for its existence in the brain in the first place.

Other conclusions may also be derived from this neuroscientific analysis: as proposed earlier, learning, persistence and motivation are important requirements for creativity, and not its simple inheritance, supernatural endowment or ‘out of nowhere’ inspiration. In addition, not only are these requirements also influenced by knowledge accessibility, but they are also reinforced by its obtainment, through a positive feedback-loop which increasingly potentiates successful creative thinking. In resume, the enrichment of one’s neural network through learning, which contributes to greater creative success, facilitates

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<sup>223</sup> R. M. Ryan and E. L. Deci, ‘Self-Determination Theory and the Facilitation of Intrinsic Motivation, Social Development, and Well-Being’ (2000) 55 *Am. Psychol.* 55, 70.

<sup>224</sup> See generally, Stefano I. Di Domenico and Richard M. Ryan ‘The Emerging Neuroscience of Intrinsic Motivation: A New Frontier in Self-Determination Research’ (2017) 11(145) *Frontiers in Human Neuroscience* 1.

<sup>225</sup> See generally, J. A. Gray and N. McNaughton, *The Neuropsychology of Anxiety: An Enquiry into the Functions of the Septo-Hippocampal System* (Oxford University Press 2000).

<sup>226</sup> *Ibid*

and inspires the learning of additional, more diverse knowledge, and the tackling of new creative problems. Faced with the need for creativity expressed in Chapter 2, this importance of access is only made more crucial with the promising capacities residing in the unparalleled present-day ability of accessing and sharing knowledge, of educating creativity and of knowing that creativity is a potential in every individual, and not reserved to just a few.

These considerations convey the significance of copyright's impact on the neurobiological development of creativity through its capacity to dictate access to knowledge, namely that which exists in literary and artistic works, besides its direct influence on incentivizing (or demoralizing) authors to produce creative works by granting them exclusive rights over their creations. Particularly, this impact is greatly determined by the consecrated term of copyright protection, which, as will be seen, is shaped by copyright's own conception of how creativity is developed. Thus, this neuroscientific analysis in conjunction with the overview of creativity provided in Chapter 2 should shed light on copyright's notion of creativity in order to better guide the formulation of its terms of protection.

## Chapter 4 - Creativity and Copyright's term of protection: a relationship of mutual affection

Having established what creativity is, its importance for tackling tomorrow's unforeseeable realities was likewise vouched for due to its empowering traits in face of such instability. Subsequently, with the aim of better guiding copyright's conception of creativity, its neurobiological foundations were studied and they allowed the comprehension of what it relied on to flourish, and it permitted the understanding of what may incentivize or suppress its production. In the end, influencing factors of creative thinking such as learning, perseverance, and motivation seemed to be all tied to knowledge and the possibility of accessing it. Thus, this chapter will be reserved to the comprehension of how copyright's conception of creativity has shaped its term of protection, in order to question those foundations so they may be better aligned with creativity's development.

### 4.1. The influence of copyright's conception of creativity on current terms of protection

#### 4.1.1. What is copyright?

Copyright belongs to a category of property rights named Intellectual Property (IP)<sup>227</sup> which encompasses a wide range of rights over different types of intangible creations.<sup>228</sup> Copyright itself grants authors of literary and artistic works,<sup>229</sup> at the time of their creation,<sup>230</sup> certain exclusive rights<sup>231</sup> for a determined period of time. However, copyright protection merely encompasses the author's expression of an idea,<sup>232</sup> not the

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<sup>227</sup> See its European consecration in the Charter of Fundamental Rights of the European Union 2012, Art. 17(2).

<sup>228</sup> Peter Drahos, *A Philosophy of Intellectual Property* (ANU eText 2016) 1; Intellectual property rights include patents, copyrights, trademarks, designs, trade secrets, geographical indications, plant varieties, and semiconductor topographies. Annette Kur and Thomas Dreier, *European*.

<sup>229</sup> For an extended description of included works, see *e.g.* Berne Convention for the Protection of Literary and Artistic Works as amended on September 28, 1979 (Berne Convention) Articles 1 and 2 (1); Regarding the protection of non-original databases, in the EU, *sui generis* rights may be granted to the creator of a database based on the evidence of a substantial investment in its creation, with no considerations of originality. In the USA, however, copyright protection is not attributed to such databases. Directive 96/9/EC Chapter III; Annette Kur and Thomas Dreier, *European Intellectual Property Law. Text, cases and materials* (Edward Elgar 2013) 241; EPO and EUIPO, *Intellectual Property Teaching Kit IP Basics* (EPO 2016) 268; Daniel J. Gervais, 'Feist goes global: a comparative analysis of the notion of originality in copyright law' (2002) 49 *Journal of the Copyright Society of the U.S.A.* 949, 956; In the EU, copyright protection includes computer programs, but such protection is not harmonised internationally. Dreier *et al*, *European Intellectual Property Law* 241; EPO and EUIPO, *Intellectual Property Teaching Kit IP Basics* (EPO 2016) 82.

<sup>230</sup> Copyright protection is granted automatically as soon as the work is created, without the need to fulfill any formalities such as registration, even though countries may provide the possibility for author's to do so, as it can be an advantage, for example, in disputes over who its creator is. European IPR Helpdesk, *The European IPR Helpdesk* 33.

<sup>231</sup> See Berne Convention for a detailed list of existing rights, such as the right of reproduction, the right of translation, and the right to authorize the broadcasting of the authors work.

<sup>232</sup> See *e.g.* TRIPS Article 9 (2).

idea itself which can usually be articulated in diverse ways.<sup>233</sup> It also tends to only cover works that have been expressed in some form,<sup>234</sup> and which are original.<sup>235</sup>

To be noted, copyright has been and will continue to be used throughout most of this thesis as encompassing both the *stricto sensu* copyright doctrine and the originally French doctrine of *droit d'auteur* or author's rights, both of which have a different approach regarding the regulation of author's works.<sup>236</sup> Subsequently, when relevant disparities between the both must be considered, a contrasting denomination will be called upon.

With this being said, albeit the degree of protection may vary between jurisdictions,<sup>237</sup> copyright generally encompasses both economic and moral rights. The first, provide the author rights holder<sup>238</sup> with ways to be remunerated,<sup>239</sup> by being able to sell, license, and control the use or reproduction of a certain protected work. In turn, moral rights recognize a link that connects the author's personality to his work and, therefore, attribute him a set of rights to control the work's paternity or attribution, and its integrity.<sup>240</sup> Concretely, as categories of rights,<sup>241</sup> the right to paternity allows the author to be named as such against other claimants and to decide whether it wants to include his name on the work or rather create it under a pseudonym or in anonymity, while the integrity right permits the author

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<sup>233</sup> However, such distinction can only be made when considering the specific characteristics of each case, since it can be a difficult task to discern between ideas and expressions, and to demarcate where one begins and the other ends. EPO and EUIPO, *Intellectual Property Teaching Kit IP Basics* (EPO 2016) 82.

<sup>234</sup> Though not necessarily a material one. See *e.g.* Berne Convention Article 2 (2).

<sup>235</sup> As mentioned, *sui generis* rights regarding non-original databases are one exception to this. Besides, there is no international or consensus on what originality is. See generally, Gervais, 'Feist goes global'.

<sup>236</sup> For an extended comparison of both systems throughout history, see generally Peter Baldwin, *The Copyright Wars. Three Centuries of Trans-Atlantic Battle* (Princeton University Press 2014).

<sup>237</sup> Today, both economic and moral rights are enshrined in every civil law system in the European Union although moral rights have not been harmonised. In fact, notwithstanding the recognition of moral rights in the Berne Convention, which establishes a minimum standard of protection in its 176 parties, the extent of their admission can still vary considerably regarding their alienability, term of protection and assertion, particularly between civil law and common law systems. Compare *e.g.* Articles 77-89 of the UK Copyright, Designs and Patents Act (1988 C.48) and Articles L121-1 to L121-9 of the French Intellectual Property Code (amended 2018 by Law No. 2018-670); For an analysis of the USA and the EU systems see, generally, Elizabeth Schéré, 'Where is the Morality? Moral Rights in International Intellectual Property and Trade Law' (2018) 41 (3) *Fordham International Law Journal* 773.

<sup>238</sup> Author rights holders may be the creator of the work, its successors or any alienee of a transferable author right.

<sup>239</sup> There are several exclusive rights that, with different extents, may be attributed to the copyright holder to be capitalized on: the rights to authorize the reproduction, performance and communication to the public of the work, to obtain an interest in each subsequent sale of the work after its first transfer, among others. See *e.g.* Berne Convention Articles 9, 11, 14 *ter*. At the European level, beyond national legislations, the enforcement of Intellectual Property rights is governed by Directive 2004/48/EC with some copyright specific mechanisms inserted in the debated Directive 2016/0280.

<sup>240</sup> Noreen Wiscovitch Rentas, 'Moral Rights Exclusion in the North American Free Trade Agreement and the General Agreement on Tariff and Trade: A Legal Proposal for the Inclusion of Moral Rights in Future Free Trade Agreements in Latin America and the Caribbean' (1996) 35(1) *Revista de Derecho Puertorriqueño* 1, 4-5.

<sup>241</sup> For a more detailed list of possible rights included, depending on each country, see *e.g.* Arathi Ashok, 'Moral Rights – TRIPS and Beyond: The Indian Slant' (2013) 59(3) *J. COPYRIGHT SOC'Y U.S.A.* 697, 700-702.; Noreen Wiscovitch Rentas, 'Moral Rights Exclusion in the North American Free Trade Agreement' 4-5.

to conserve his work against unwanted modification, distortion or mutilation.<sup>242</sup> Moreover, these rights have certain ‘terms of protection’ which dictate for how long a certain work is protected and its author granted the corresponding exclusive rights. The period of protection of economic and moral rights may vary, but when this term finishes, the author loses these rights<sup>243</sup> and the work becomes available to the public to be utilized without the need for the author’s consent. This consequence is also referred to as the work falling or belonging into the ‘public domain’.

#### 4.1.2. What are the current terms of protection?

Internationally, the great majority of countries (176) is a contracting party of the Berne Convention which has established, with practically worldwide reach, a minimum term of protection covering the life of the author plus 50 years after his death.<sup>244</sup> Particularly, even though the European Union and the United States current terms of protection may be higher than those prescribed by the Convention, it could be said that they derive from them. In fact, Directive 93/98/CEE<sup>245</sup> established the European Union current term, comprising an author’s life and 70 years after, due to the alleged need to ‘provide protection for the author and the first two generations of his descendants’<sup>246</sup> in compliance with the Convention’s intended level of protection, albeit updated to the growth in lifespan seen in the former European Community. On the other hand, the US consecrated an identical period in 1998 with the Copyright Term Extension Act (CTEA),<sup>247</sup> whose enactment was justified to harmonize its term with that of the EU,<sup>248</sup> thus coming full-circle to the relevance of the protection granted by the Berne Convention.

In addition, the introduction in the 1994 TRIPS Agreement of a requirement for all WTO<sup>249</sup> members to comply with the Berne Convention,<sup>250</sup> effectively made a country’s capacity to participate in world trade dependent on the acceptance of its regime.<sup>251</sup> Therefore, the Berne Convention represents the convergent point for copyright protection throughout the world, bearing an immense territorial scope and influence on the

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<sup>242</sup> Arathi Ashok, ‘Moral Rights’ 697, 700; Noreen Wiscovitch Rentas, ‘Moral Rights Exclusion in the North American Free Trade Agreement’ 1, 4-5; Elizabeth Schéré, ‘Where is the Morality? Moral Rights in International Intellectual Property and Trade Law’ (2018) 41 (3) Fordham International Law Journal 773, 775; Berne Convention Article 6 *bis* (1).

<sup>243</sup> Except when moral rights are prolonged *ad infinitum*.

<sup>244</sup> Berne Convention for the Protection of Literary and Artistic Works 1886, as amended on September 28, 1979, Article 7(1).

<sup>245</sup> Revoked by Directive 2006/116/EC which was then amended by Directive 2011/77/EU.

<sup>246</sup> Directive 93/98/EEC Recital 5. Although, as seen *infra*, the WIPO’s guide to the Convention refers to the protection of three generations of descendants, not two.

<sup>247</sup> In addition to an extended term for corporate authorship of 120 years after creation or 95 after publication, whichever end is earlier. Copyright Term Extension Act 1998. 112 Stat. 2827, Title I Section 102.

<sup>248</sup> ‘The reason why you’re going to life-plus-70 today is because Europe has gone that way’ in Copyright Term, Film Labeling, and Film Preservation Legislation: Hearings on H. R. 989 et al. before the Subcommittee on Courts and Intellectual Property of the House Committee on the Judiciary, 104th Cong., 1st Sess., 230 (1995).

<sup>249</sup> World Trade Organization, which as of 2018 comprises 164 countries as members. < [https://www.wto.org/english/thewto\\_e/whatis\\_e/tif\\_e/org6\\_e.htm](https://www.wto.org/english/thewto_e/whatis_e/tif_e/org6_e.htm) > Accessed 13 December 2018.

<sup>250</sup> Nonetheless, the US were able to exclude the protection of moral rights (Berne Convention Article 6*bis*) from such compliance, Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) Article 9 (1).

<sup>251</sup> Kawohl, ‘The History and Philosophy of Copyright’ 28.

construction of posterior individual regimes. For this reason, when looking at how copyright's notion of creativity has influenced 'current terms of protection', this influence will be analyzed from the moment of copyright's origin to the formulation of the Berne Convention which has, in turn, shaped practically every country's current copyright term of protection.

#### 4.1.3. The influence of creativity's conception on current terms of copyright protection

Copyright has been constructed around two main assumptions: on one hand, the authors of artistic and literary works are considered to deserve compensation for their creative production. This may be due to the simple fact that they created the work, due to the discouragement to produce further works that the authors may feel if no award is given, or both. On the other hand, those works are also considered to be part of 'society's cultural patrimony',<sup>252</sup> and their access and use are valued for the cultural and intellectual enrichment it provides. Copyright has typically answered to both considerations by granting authors exclusive rights over their works, though only for a limited period of time (term of copyright protection), so that society may access and utilize them in a cheaper way and without the author's permission. Therefore, the length of the term of protection bears central importance in balancing both interests. First, it influences authors' incentive to create, as it determines the period a rights holder may exclusively economically exploit and control the use of its work. Secondly, it establishes when such exclusivity ends, after which the public is able to acquire the work for a lower price, and share, transform or copy it at their will.<sup>253</sup> Looking from a systems notion of creativity, the importance of the term of protection becomes evident: it has not only the potential to dictate for how long society and the individual are restricted from easily accessing the knowledge contained in an author's work, but it also has the capacity to measure the stimulus given to the individual to produce a creative contribution.

However, the question of how long the term of protection should be has had different answers throughout time and place. As will be seen, these answers are shaped by notions of creativity possessed by those replying. In fact, looking from a systems model of creativity as here presented, it is possible to see that those answers have historically been formulated around the importance given to the individual, the field, and the domain, in the construction of creative works. At times, some considered the author as a mere conductor of God's will who had bestowed upon the artist a creative gift that had to be shared with society. For these, the importance of the field's acquisition of novelty surpassed that of the author's compensation (individual), thus advocating shorter terms of protection. Others argued the contrary, defending the author's solitary genius, who required no help from its sociocultural components, hence arguing for greater terms.<sup>254</sup>

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<sup>252</sup> Baldwin, *Copyright Wars* 3.

<sup>253</sup> Tito Rendas, "Para o infinito e mais além?" 182.

<sup>254</sup> Regarding these two positions, Giancarlo Frosio describes the early 18<sup>th</sup> century scenario: 'The traditional view that creativity (...) was a gift of God resistant to propertization faced the rising forces of (...) the emerging idea that an individual is the sole proprietor of his or her own skills – and owes nothing to society for them' in Giancarlo Frosio, *Reconciling Copyright with Cumulative Creativity, The Third Paradigm* (Edward Elgar Publishing Limited 2018) 224.

With that being said, what is then the notion of creativity behind the formulation of the general terms of protection in the Berne Convention, as established in its Article 7(1)? The Convention's text itself does not provide much guidance into what lead to the consecration of its term of protection. However, the World Intellectual Property Organization (WIPO), which is the international entity responsible for administering the Convention, published in 1978 a guide<sup>255</sup> to the Convention's 1971 text, in which it detailed the reasons subjacent to the construction of its Articles. In respect to Article 7 (1), the guide states that the Convention's general term, pretending to cover an author's average lifetime and three generations of his direct descendants, was not chosen 'merely by chance'.<sup>256</sup> Instead, it affirms that it was chosen because 'most countries felt it fair',<sup>257</sup> and it was 'generally felt normal'<sup>258</sup> that the author's heirs profit from his work 'while they remember him'.<sup>259</sup> It also states that the chosen length represents a fair balance between the author and society's interests.<sup>260</sup> Unfortunately, such explanation does not provide a significant enough insight into the reasons why that specific length was chosen. As will be explored hereafter, the almost unarguable 'feeling' shared by 175 countries (out of 195 in the world)<sup>261</sup> that this term is fair and normal, results from a lengthy process of crystallization of such notion to which the guide's justification does not do justice.

Thus, to truly comprehend the reasons which lead to the emergence of this consensus, it is crucial to analyse its historical emergence (and that of copyright itself), prior to such global acceptance. Notably, as will be seen, the formation of the Convention's term of protection will be accompanied and dictated by shifts in the conception of creativity which, in turn, will affect the development of creativity itself.

#### 4.1.3.1. A brief history of creativity and the term of copyright protection

Historically, up until the end of the Renaissance, creativity in Western culture was mostly conceived as a cumulative process.<sup>262</sup> This notion resided in the idea that novel works were conceived through the imitation of past ones,<sup>263</sup> subsequently leading to artistic excellence and, possibly, to the surpassing of prior authors.<sup>264</sup> Such conception can be

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<sup>255</sup> WIPO, *Guide to the Berne Convention for the Protection of Literary and Artistic Works (Paris Act, 1971)* (WIPO 1978).

<sup>256</sup> WIPO, *Guide to the Berne Convention* 46

<sup>257</sup> Ibid.

<sup>258</sup> Ibid.

<sup>259</sup> Ibid.

<sup>260</sup> Ibid.

<sup>261</sup> WIPO, < [https://www.wipo.int/treaties/en/ShowResults.jsp?treaty\\_id=15](https://www.wipo.int/treaties/en/ShowResults.jsp?treaty_id=15) > Accessed 8 January 2019.

<sup>262</sup> Giancarlo Frosio, *Reconciling Copyright with Cumulative Creativity, The Third Paradigm* (Edward Elgar Publishing Limited 2018) 24, 35.

<sup>263</sup> In Ancient Greece, regarding the role of the painter, Plato says it imitates "that which the others make" and not "that which originally exists in nature" in Plato, *The Republic* Book X < [https://en.wikisource.org/wiki/The\\_Republic/Book\\_X](https://en.wikisource.org/wiki/The_Republic/Book_X) > Accessed 23 June 2018; However, in China, for example, "Unlike the Western world of a surprising Creation, of man at war with nature, the world of Confucius transformed by Taoist and Buddhist currents saw man at home among transformations, procreations, and recreations" (p. 17) in Daniel J. Boorstin, *The Creators. A History of Heroes of the Imagination* (Random House 1992) 4-19;

<sup>264</sup> 'Did he [Cicero] devote himself to the imitation of one person? No, he strove to copy what was especially appropriate in every one (...) to imitate those which he approved of in such a way as to surpass if possible' in Desiderius Erasmus, *Ciceroniamus or A Dialogue on the Best Style of Speaking* (Edition of 1536



traced to the cultural carriage of oral tradition, passed down and renewed through generations,<sup>265</sup> with which the formulation of ancient epics intersects.<sup>266</sup> It is equally present in the concept of *interpretatio*,<sup>267</sup> *imitatio*, and *aemulatio*, by which Roman authors strived to rival previous Greek masters by borrowing elements of the latter's works into one of their own.<sup>268</sup> Likewise, the popular 'centones' of the medieval period, which were artistic 'patchworks', made of phrases from several authors' poems into a novel one,<sup>269</sup> stand for the acknowledgment of this cumulative notion of creativity.

Consequently, due to this socially-accepted conviction that one's artistic emulation of inspiring works and authors derived from their imitation, in addition to the compliment that such mimicry was seen to represent regarding the imitated authors, a work's authorship was rarely relevant.<sup>270</sup> In fact, during the classical and medieval period, even though artistic works could be divinely praised, artists<sup>271</sup> themselves, were mostly disregarded.<sup>272</sup>

However, with the dawn of the Renaissance, a shift in the conception of creativity began to take place. As strenuous effort in copying the masters of old began to lose admiration,<sup>273</sup> the awe for an artist's 'unique genius', that is, his inimitable personality and creative ability, became the revered<sup>274</sup> source of creativity. A greater emphasis was attributed to a work's authorship, and the value of an artistic piece started residing not in what or how it was represented, but in who created it, particularly if it had been made 'by an individual artist of genius'.<sup>275</sup> An important contributor for this view was the establishment of a scientific approach to art, with mathematics at its core, which made

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translated by Izora Scott, Columbia University 1908) 79; See generally, W. Pigman III *Versions of Imitation in the Renaissance* (1980) 33(1) *Renaissance Quarterly* 1.

<sup>265</sup> '[Oral traditions] are the representation of the past in the present. One cannot deny either the past or the present in them' in Jan Vansina, *Oral Tradition as History* (University of Wisconsin Press 1985).

<sup>266</sup> Giancarlo Frosio, *Reconciling Copyright with Cumulative Creativity, The Third Paradigm* (Edward Elgar Publishing Limited 2018) 24.

<sup>267</sup> Or *translatio*. It comprised the translation of a given source.

<sup>268</sup> See generally, Arno Reiff, '*Interpretatio, imitatio, aemulatio: Begriff und Vorstellung literarischer Abhängigkeit bei den Römern*' (Druck Triltsch 1959); James Hardin, *Translation and Translation Theory in Seventeenth-Century Germany* (Rodopi 1992) 59.

<sup>269</sup> Giancarlo Frosio, *Reconciling Copyright with Cumulative Creativity, The Third Paradigm* (Edward Elgar Publishing Limited 2018) 49.

<sup>270</sup> Jan Ziolkowski, 'The Highest Form of Compliment: Imitatio in the Medieval Latin Culture' in John Marenbon (ed.), *Poetry and Philosophy in the Middle Ages: A Festschrift for Peter Dronke* (Brill 2001); Giancarlo Frosio, *Reconciling Copyright with Cumulative Creativity, The Third Paradigm* (Edward Elgar Publishing Limited 2018) 204.

<sup>271</sup> At the time, manual artists such as sculptors were considered 'artisans' and their profession seen as a lowly occupation. Giancarlo Frosio, *Reconciling Copyright with Cumulative Creativity, The Third Paradigm* (Edward Elgar Publishing Limited 2018) 201.

<sup>272</sup> 'For it does not necessarily follow, that, if a piece of work please for its gracefulness, therefore he that wrought it deserves our admiration.' In Plutarch, *Pericles*, translated by John Dryden II 2 < <https://people.ucalgary.ca/~vandersp/Courses/texts/plutarch/plutperi.html#II> > Accessed 10 December 2018.

<sup>273</sup> Noleine Fitzallen, Robyn Reaburn, Si Fan (Eds.), *The Future of Educational Research. Perspectives from Beginning Researchers* (Sense Publishers 2014) 113.

<sup>274</sup> In Rome, 1538, the Portuguese painter Francisco de Hollanda noted that "in Italy, one does not care for the renown of great princes, it's a painter only that they call divine" in Boorstin, *The Creators* (n 3) 408.

<sup>275</sup> Joseph Leo Koerner, *The Moment of Self-Portraiture in German Renaissance Art* (University of Chicago Press 1993) 46.

the artist an intellectual, distinguished from the craftsman.<sup>276</sup> This led to the shift of the artist's workplace from workshops to schools, and from his traditional role as an artisan to the affirmation of his personality as an artist.<sup>277</sup> In turn, the creator's genius derived from having been born 'with an innate talent that could not be learned',<sup>278</sup> whose gift to create came from 'above'.<sup>279</sup>

Subsequently, by the eighteenth century, founded upon these ideas, Romanticism emerged with individuality and its consequent pursuit of originality as its prime characteristics, which led to the conception of the author's 'original genius'.<sup>280</sup> Individuality consisted on the promotion of the author's uniqueness, namely through the cult of his personality, and the praise for his giftedness and originality. At this time, there was an exacerbation of the Renaissance adulation of the author's personality, and an increase in admiration, not for the artistic works themselves, but for their personal connection with the author.<sup>281</sup> Nonetheless, opposed to the Renaissance view that the artist's gift was divinely attributed, such giftedness was now separated from divine intervention and seen as residing within the author's mind,<sup>282</sup> whose works were solely his creation and indivisible from his genius.<sup>283</sup> Nothing was granted to the author: he carried his own gift with which he created. In addition, an author's originality was now related to his 'artlessness',<sup>284</sup> which meant that he created without reference to previous artistic works, guided by an inexplicable inspiration.<sup>285</sup> Original works, therefore, could not be achieved by imitation, whose practice was profoundly rejected. It was from this pursuit of unduplicability that the 'original genius' was born, an author who possessed the intellectual gift to create artistic works from unintelligible inspirations. Lastly, this individualistic conception of genius was based on the assumption that creativity was a special quality given only to an elite of favoured individuals.<sup>286</sup>

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<sup>276</sup> Arnold Hauser, *The Social History of Art. Vol. II. Renaissance, Mannerism Baroque* (Routledge & Kegan Paul 1962) 55 – 56.

<sup>277</sup> Ibid.

<sup>278</sup> Joseph Leo Koerner, *The Moment of Self-Portraiture in German Renaissance Art* (University of Chicago Press 1993) 45; Leonardo da Vinci even declared artistic endeavours to be superior to other sciences since they were impersonal, while art is tied 'to the individual and his inborn abilities'. Arnold Hauser, *The Social History of Art. Vol. II. Renaissance, Mannerism Baroque* (Routledge & Kegan Paul 1962) 57.

<sup>279</sup> Joseph Leo Koerner, *The Moment of Self-Portraiture in German Renaissance Art* (University of Chicago Press 1993) 45.

<sup>280</sup> Giancarlo Frosio, *Reconciling Copyright with Cumulative Creativity, The Third Paradigm* (Edward Elgar Publishing Limited 2018) 207.

<sup>281</sup> Among other aspects, Hauser argues that this can be seen in the increasing admiration for artistic 'fragments' such as drawing and sketches, which 'revealed the process of artistic invention at its starting point, where it was almost completely merged with the subjectivity of the artist' in Arnold Hauser, *The Social History of Art. Vol. II. Renaissance, Mannerism Baroque* (Routledge & Kegan Paul 1962) 64.

<sup>282</sup> Alexander Gerard, *An essay on Genius* (W Strahan 1774) 3.

<sup>283</sup> Giancarlo Frosio, *Reconciling Copyright with Cumulative Creativity, The Third Paradigm* (Edward Elgar Publishing Limited 2018) 208.

<sup>284</sup> Jonathan Bate, *The Genius of Shakespeare* (Oxford University Press 1998) 161.

<sup>285</sup> As cited by Jonathan Bate, 'genius' was described by the Oxford English Dictionary as 'to denote that particular kind of intellectual power which has the appearance of proceeding from a supernatural inspiration or possession, and which seems to arrive at its results in an inexplicable and miraculous manner' in Jonathan Bate, *The Genius of Shakespeare* (Oxford University Press 1998) 162.

<sup>286</sup> Margaret A. Boden, 'Creativity as a Neuroscientific Mystery' in Oshin Vartanian, Adam S. Bristol, and James C. Kaufman, *Neuroscience of Creativity* (MIT Press 2013) 3.

These transformations were partly driven by the shift from ‘private patronage, to the free unprotected market’<sup>287</sup> of the 18<sup>th</sup> century, which compelled artists to fiercely promote their individuality. Consequently, the obsession with originality and the fear of being considered a plagiarist, made accusations of plagiarism became commonplace.<sup>288</sup>

It is also argued that the emancipation from the divine endowment of giftedness and construction of genius<sup>289</sup> originated with the appearance of the idea of intellectual property,<sup>290</sup> since as long as the artist was a vehicle of divinity’s expression, he could not autonomously own his creations, nor would there be such an absolute connection between the author and his work.<sup>291</sup> On the contrary, the view of the artist as a divine medium was compatible with the free reuse of other artists’ creativity, as it was unowned by them but rather granted from above. There was even an obligation for the author to share his gift with the community.<sup>292</sup> However, in the new purely individual concept of creativity, no such restrictions existed regarding the author’s exclusivity to ‘his’ works. As a result, the concept of creating novel works inspired in previous ones and the perspective of contemporary authors as successors of those who came before, began to be rejected and entered into decay. In 1668, this ensuing rejection could already be foreshadowed in Langbaine’s assessment:

‘Having read most of our English Plays, as well ancient as those of latter date, I found that our modern Writers had made incursions into the deceas’d Authors Labours, and robb’d them of their Fame.’<sup>293</sup>

These conditions set the stage for the development of intellectual property, namely copyright, and it was indeed under this contemporary conception of creativity that the latter originated.<sup>294</sup>

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<sup>287</sup> Arnold Hauser, *The Social History of Art. Vol. II. Renaissance, Manneirism Baroque* (Routledge & Kegan Paul 1962) 63.

<sup>288</sup> See e.g., William Lauder, *An essay on Milton’s Use and Imitation of the Moderns, in His Paradise Lost* (J. Payne and J. Bouquet 1750).

<sup>289</sup> In fact, up until then, ‘genius’ was differently constructed as being the person’s ‘spirit’, which governed one’s ‘fortunes and determine his character, and finally to conduct him out of the world’ in Jonathan Bate, *The Genius of Shakespeare* (Oxford University Press 1998) 162.

<sup>290</sup> As well as from the weakening of Christianity’s cultural dominance. Arnold Hauser, *The Social History of Art. Vol. II. Renaissance, Manneirism Baroque* (Routledge & Kegan Paul 1962) 62

<sup>291</sup> Arnold Hauser, *The Social History of Art. Vol. II. Renaissance, Manneirism Baroque* (Routledge & Kegan Paul 1962) 62

<sup>292</sup> Giancarlo Frosio, *Reconciling Copyright with Cumulative Creativity, The Third Paradigm* (Edward Elgar Publishing Limited 2018) 218.

<sup>293</sup> Gerard Lagbaine, *Momus Triumphans: or, The Plagiaries of the English Stage; Expos’d in a Catalogue* (Nicholas Cox 1688) < <https://babel.hathitrust.org/cgi/pt?id=osu.32435018427773;view=1up;seq=12> > Accessed 20 December 2018.

<sup>294</sup> Martha Woodmansee, ‘The Genius and the Copyright: Economic and Legal Conditions of the Emergence of the Author’ (1984) 17(4) *Eighteenth-Century Studies* 425, 426.

At the turn of the 18<sup>th</sup> century, ‘crown privilege’ systems,<sup>295</sup> which granted, for a fee, monopoly rights to print artistic works,<sup>296</sup> were present in several European countries.<sup>297</sup> These rights were mostly attributed to printers, giving them a right to copy, and not to the authors themselves.<sup>298</sup> In Great Britain, it was the London guild of printers named the ‘Stationers’ Company’ who controlled the book trade.<sup>299</sup> Its booksellers possessed the exclusive right to print literary works, while the Company was also given the power to censor them.<sup>300</sup> In time, however, the desire to regulate the Stationers’ trade monopoly,<sup>301</sup> in conjunction with the emphasis on the importance of authors’ dignity and free circulation of ideas,<sup>302</sup> prompted a crucial departure from these centralized privileges.

In result, the Statute of Anne<sup>303</sup> was enacted in 1710, granting, for the first time, exclusive rights to authors and assignees<sup>304</sup> of literary works, with the emphatically stated purpose of being ‘[a]n Act for the encouragement of learning’.<sup>305</sup> Importantly, a significant shift brought by the Statute was the settlement of a limited term of copyright protection after which the book would be open to the public domain to be freely used. Concretely, the term was of 21 years for books already in print, and 14 years for new books, starting on the date of their publication, with a possible renewal of this period in case the author was still alive when it terminated.<sup>306</sup>

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<sup>295</sup> This system was originally created to balance the reprinting of popular books, made prevalent due to the invention of Gutenberg’s printing press around 1450, and the profitability of printers; Friedemann Kawohl, ‘The History and Philosophy of Copyright’ (2004) 21, 24 in Simon Frith and Lee Marshall (ed.) *Music and Copyright* (University Press 2004).

<sup>296</sup> Not only literary works but also, for example, music. Ugo Mattei, John D. Haskell, *Research Handbook on Political Economy and Law* (Edward Elgar 2015) 524.

<sup>297</sup> Kawohl, ‘The History and Philosophy of Copyright’ 4.

<sup>298</sup> Kawohl, ‘The History and Philosophy of Copyright’ 4.

<sup>299</sup> Lyman Ray Patterson, *Copyright in Historical Perspective* (Vanderbilt University Press 1968) 144.

<sup>300</sup> Bestowed at the time by the Licensing of the Press Act 1662, whose explanatory long title was ‘An Act for preventing the frequent Abuses in printing seditious treasonable and unlicensed Books and Pamphlets and for regulating of Printing and Printing Presses.’ In fact, the royal charter that originated the Company goes back to 1557, in ‘an attempt by the catholic Queen Mary to control the spread of heretical material’ Friedemann Kawohl, ‘The History and Philosophy of Copyright’ (2004) 21, 25 in Simon Frith and Lee Marshall (ed) *Music and Copyright* (University Press 2004).

<sup>301</sup> For Patterson, this was in fact the main reason for the enactment of the Statute of Anne: ‘nor was it [the statute] intended primarily to benefit authors. It was a trade-regulation statute enacted (...) to prevent a continuation of the booksellers’ monopoly’ in Lyman Ray Patterson, *Copyright in Historical Perspective* (Vanderbilt University Press 1968) 143.

<sup>302</sup> Mark Rose ‘The Public Sphere and the Emergence of Copyright: *Areopagitica*, the Stationers’ Company, and the Statute of Anne’ (2010) 67, paragraph 23 in Ronan Deazley, Martin Kretschmer and Lionel Bently (eds), *Privilege and Property. Essays on the History of Copyright* (2010 Cambridge: Open Book Publishers).

<sup>303</sup> *Statutes of the Realm* (Record Commission 1810-1825) 8 Ann c.21.

<sup>304</sup> ‘The radical change in the statute, however, was not that it gave authors the right to acquire a copyright - a prerogative until then limited to members of the Stationers’ Company - but that it gave that right to all persons’. After the statute, the only right unavailable to purchasers was the right to renew the copyright. Lyman Ray Patterson, *Copyright in Historical Perspective* (Vanderbilt University Press 1968) 146.

<sup>305</sup> The complete long title is ‘An Act for the Encouragement of Learning, by Vesting the Copies of Printed Books in the Authors or Purchasers of such Copies, during the Times therein mentioned.’

<sup>306</sup> Tito Rendas, ‘“Para o infinito e mais além?” O prazo de protecção do direito de autor.’ (2015) in IICM – *Instituto Internacional Casa de Mateus et al, Infinito (Cadernos Mateus DOC 2015)* 173, 177; Mark Rose ‘The Public Sphere and the Emergence of Copyright: *Areopagitica*, the Stationers’ Company, and the Statute of Anne’ (2010) 67, paragraph 25 in Ronan Deazley, Martin Kretschmer and Lionel Bently (eds), *Privilege and Property. Essays on the History of Copyright* (2010 Cambridge: Open Book Publishers).

By the time of the statute's enactment, an individualistic view of creativity was already starting to take root in Europe,<sup>307</sup> and literary property started being promoted as a deserved natural right,<sup>308</sup> derived from the author's labor and skills, for which he 'owe[d] nothing to society'.<sup>309</sup> In addition, the support for the perpetuity of such property ensued a legal battle that lasted for more than 60 years: the so-called 'battle of the booksellers'.<sup>310</sup> Such name derives from the booksellers protested attempt to establish copyright protection *ad eternum*. Having lost their royal privileges, and with little chance of getting them back, their new strategy to defend their interests encompassed the call for author's eternal protection so that the booksellers could retain any copyrights sold to them for that amount of time.<sup>311</sup>

Nevertheless, perpetuity was rejected and the statute's consecrated term of protection, alongside confirming decisions,<sup>312</sup> demonstrated the consideration given in English society to both the author's protection and the public benefit,<sup>313</sup> through which copyright would serve as an intermediary. This duality of interests can be found in Edward Young's conception of creativity who, at the same, considered that original genius was:

'of a vegetable nature; it rises spontaneously from the vital root of genius',<sup>314</sup> and that 'an imitator shares his crown, if he has one, with the chosen object of his imitation; an original enjoys an undivided applause'.<sup>315</sup>

Although he also argued that:

'wit, indeed, however brilliant (...) should sacrifice its most darling offspring to the sacred interests of virtue, and real service of mankind'.<sup>316</sup>

Subsequently, in 1787, this conception of copyright as comprising both the author and the public domain would be consecrated in the US Copyright Clause, which was then unanimously<sup>317</sup> incorporated into the US Constitution. It empowered Congress to:

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<sup>307</sup> Giancarlo Frosio, *Reconciling Copyright with Cumulative Creativity, The Third Paradigm* (Edward Elgar Publishing Limited 2018) 224-225.

<sup>308</sup> Baldwin, *Copyright wars* 53.

<sup>309</sup> Giancarlo Frosio, *Reconciling Copyright with Cumulative Creativity, The Third Paradigm* (Edward Elgar Publishing Limited 2018) 225.

<sup>310</sup> Martin Kretschmer, Lionel Bently and Ronan Deazley, 'Introduction. The History of Copyright History: Notes from an Emerging Discipline' (2010) in Ronan Deazley, Martin Kretschmer and Lionel Bently (eds) *Privilege and Property Essays on the History of Copyright* (Cambridge Open Book Publishers 2010) 7.

<sup>311</sup> Baldwin, *Copyright wars* 53.

<sup>312</sup> See e.g. *Donaldson v. Becket* (1774).

<sup>313</sup> Kawohl, 'The History and Philosophy of Copyright' 14.

<sup>314</sup> Edward Young, *Conjectures On Original Composition. In a Letter to the Author of Sir Charles Grandison* (A. Millar and R. and J Dodsley 1759) 339.

<sup>315</sup> Edward Young, *Conjectures On Original Composition* 339.

<sup>316</sup> *Id* 338.

<sup>317</sup> See generally, Irah Donner, 'The Copyright Clause of the U.S. Constitution: Why Did the Framers Include It With Unanimous Approval?' (1992) 36(3) *The American Journal of Legal History* 361.

‘[P]romote the Progress of Science and the useful Arts, by securing for limited Times, to Authors and Inventors, the exclusive Right to their respective Writings and Discoveries’.<sup>318</sup>

Following this rationale, and being greatly influenced by the Statue of Anne,<sup>319</sup> the first federal Copyright Act was passed in 1790. It established a term of protection of 14 years to ‘maps, charts, and books’<sup>320</sup> with one possible renewal in case the author was still alive, while previously published books were granted 14 years of protection with no possibility of extension.<sup>321</sup>

With this being said, even though individualistic notions of creativity permeated the construction of Anglo-American copyright, it was still considered that gifted geniuses ought to share their knowledge with the public. Admittedly, such idea was not based on the interconnected relation between the authors (individual) and their sociocultural environment (domain and field), which permits an accruing cycle where authors share their works to the public, whose individuals become inspired by those creations to push the boundaries of knowledge set by their predecessors. In any case, even if unconsciously, the envisioned copyright system still promoted this relation and was, in fact, centered on the creation of an efficient system that ‘promotes authors’ creativity to benefit the public domain’.<sup>322</sup> Even though it granted authors exclusive rights to economically exploit their works and incentivize them to create, the term to do so was shaped by a focus on the work’s availability to the public for its cultural and intellectual development.<sup>323</sup>

Meanwhile, in 18<sup>th</sup> century France, the Parisian Guild of printers and booksellers faced opposition to their royal privileges similar to that suffered by the Stationers’ Company in London. Likewise, in support of the booksellers, so too was perpetual literary protection argued for,<sup>324</sup> while others were against it.<sup>325</sup> In 1777, a French Decree<sup>326</sup> reinterpreted the existing printing privileges in line with the booksellers’ rationale, though with a backfiring twist. The author was, indeed, recognized a perpetual privilege (including his heirs), but his right was also favored against that of the booksellers.<sup>327</sup> For this reason, if

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<sup>318</sup> The United States Constitution 1787, Art. I, Sec. 8, Cl. 8.

<sup>319</sup> Almost identically, its long title is ‘An Act for the Encouragement of Learning, by securing the Copies of Maps, Charts, and Books, to the Authors and Proprietors of such Copies, during the Times therein mentioned.’

<sup>320</sup> Copyright Act of 1790 Section 1.

<sup>321</sup> Ibid.

<sup>322</sup> Baldwin, *The Copyright Wars* 15.

<sup>323</sup> Baldwin, *The Copyright Wars* 15.

<sup>324</sup> See e.g. Denis Diderot, ‘Letter on the Book Trade (Excerpts selected and translated by Arthur Goldhammer)’ (2002) 131(2) *Daedalus On Intellectual Property* 48, 50.

<sup>325</sup> See e.g. Jean-François Gaultier de Biauzat, *Memorandum for consultation by the Booksellers and Printers from Lyon, Rouen, Toulouse, Marseille, and Nismе, concerning book trade privileges and their prolongations* (1776) < <https://goo.gl/2y9D9a> > Accessed 3 January 2018.

<sup>326</sup> Arrest du Conseil d’Etat du Roi, Portant Règlement sur la durée des Privilèges en Librairie (30 August 1777) < [http://www.copyrighthistory.org/record/f\\_1777a](http://www.copyrighthistory.org/record/f_1777a) > Accessed 3 January 2018.

<sup>327</sup> ‘the differing purposes of these privileges ought to be reflected in their duration: that the author clearly has a greater right to a more enduring favour, while the bookseller may only expect the favour granted to him to be proportional to his total expenditure and to the size of his operation’ in *Arrest du Conseil d’Etat du Roi, Portant Règlement sur la durée des Privilèges en Librairie* (30 August 1777) < [http://www.copyrighthistory.org/record/f\\_1777a](http://www.copyrighthistory.org/record/f_1777a) > Accessed 3 January 2018.

the author's privilege was to be transferred to a bookseller, it would be limited to the life of the author.<sup>328</sup> In result, it was now the author who was at the core of printing privileges.

Following this, in 1789, printing privileges were eventually abolished with the establishment of freedom of the press in the awakening of the French Revolution,<sup>329</sup> which subsequently resulted in the approval of the copyright Decree of 19-24 July 1793.<sup>330</sup> However, in contrast with contemporary Anglo-American copyright law, the Decree, in its Article 1, granted exclusive rights to authors for the complete duration of their lifetime,<sup>331</sup> with the author's heirs or assignees acquiring such rights for 10 years after his death.<sup>332</sup> This greater protection of the author through longer terms was not due to the absence in France of consideration for the importance of the public domain, which was, in fact, advocated by several legal theorists.<sup>333</sup> In truth, both French and Anglo-American copyright originated from an anti-monopoly ideal, in conjunction with the advocacy of freedom of speech and knowledge circulation.<sup>334</sup> However, the French doctrine of *droit d'auteur* (or authors' rights) founded by the 1793 Decree<sup>335</sup> was configured with a strong individualistic notion of creativity in mind, set by its predecessor. For this reason, albeit the Decree was a counteract against the privileges' monopoly, it was mainly against centralized booksellers,<sup>336</sup> not against the author, whose protection continued to be fundamental,<sup>337</sup> and its conception as an 'original genius' still permeated its foundations.

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<sup>328</sup> Arrest du Conseil d'Etat du Roi, Portant Règlement sur la durée des Privilèges en Librairie (30 August 1777) < [http://www.copyrighthistory.org/record/f\\_1777a](http://www.copyrighthistory.org/record/f_1777a) > accessed 3 January 2018 art.5.

<sup>329</sup> Stina Teilmann, *British and French Copyright: A Historical Study of Aesthetic Implications* (Copenhagen: Djøf Publishing, 2009) 23; Tito Rendas, 'Para o infinito e mais além?' 178.

<sup>330</sup> Named in french: *Décret de la Convention Nationale du dix-neuf juillet 1793 relatif aux droits de propriété des Auteurs d'écrits en tout genre, des Compositeurs de musique, des Peintres et des Dessinateurs*.

<sup>331</sup> Article 1 Decree of 19-24 July 1793, translation made by the author: 'Writers of all genres, music composers, painters, drawers who have engraved paintings or drawings, will enjoy during their entire life the exclusive right to sell, promote the sale, distribute their works in the territory of the Republic, and to transfer the property in whole or in part' in *Décret de la Convention Nationale, Du 19 Juillet 1793, l'an fecond de la République Française, Relatif aux droits de propriété des auteurs d'écrits en tout genre, des compositeurs de musique, des peintres et dessinateurs* available in < [https://archive.org/details/dcretdeconvent00fran\\_3](https://archive.org/details/dcretdeconvent00fran_3) > Accessed 24 November 2018.

<sup>332</sup> Idem, Article 1 (I) Decree of 19-24 July 1793.

<sup>333</sup> Jane C. Ginsburg, 'A Tale of Two Copyrights: Literary Property in Revolutionary France and America' (1990) 64(5) *Tulane Law Review*, 1006 – 1014; Giancarlo Frosio, *Reconciling Copyright with Cumulative Creativity, The Third Paradigm* (Edward Elgar Publishing Limited 2018) 235-236.

<sup>334</sup> See generally, regarding the common roots of both systems, Jane C. Ginsburg, 'A Tale of Two Copyrights: Literary Property in Revolutionary France and America' (1990) 64(5) *Tulane Law Review*, 991; Giancarlo Frosio, *Reconciling Copyright with Cumulative Creativity, The Third Paradigm* (Edward Elgar Publishing Limited 2018) 237-238.

<sup>335</sup> In conjunction with the protection of theatre performances that was already covered in 1791 in the Decrees of 13-19 January 1791 and 19 July – 6 October 1791 with the first term of protection *post mortem* (5 years after the author's). *Décret-Loi des 13-19 janvier 1791*, Article 3 and 5; *Décret-Loi des 19 juillet-6 août 1791*; Stina Teilmann, *British and French Copyright* 23.

<sup>336</sup> Le Chapelier's Report (1791) 5 < [http://www.copyrighthistory.org/cam/pdf/f\\_1791\\_1.pdf](http://www.copyrighthistory.org/cam/pdf/f_1791_1.pdf) > Accessed 4 January 2019.

<sup>337</sup> Kawohl, 'The History and Philosophy of Copyright' 19; Robert C. Hauhart, 'Natural Law Basis for the Copyright Doctrine of *Droit Moral*' (1985) *The Catholic Lawyer* 30(1) 53, 60.

In truth, even though the public enrichment was, indeed, considered,<sup>338</sup> a systematic notion of the reciprocal and cumulative relationship between an author's work with those of his peers and the public could hardly be found.<sup>339</sup> The French Decree was still contemporarily regarded as a 'Declaration of the Rights of Genius'.<sup>340</sup> Likewise, several references regarding the free circulation of ideas merely derive from the contemporary acceptance that those ideas' intangibility did not allow the author to continue<sup>341</sup> to exclusively own them beyond the point of publication.<sup>342</sup> However, such attribution of the author's ideas to the public domain did not necessarily mean that the author's relationship with the latter was conceived as complementary. It was not given that an author's work would be inspired by the public domain and vice-versa, leading to new authors and stimulating creations in an accruing creative cycle. Importantly, the conception that there was an obligation for the author to share his work with the public was based on the view that a favored individual, that is, belonging to a special class of geniuses endowed by the gift of creativity, should enlighten the rest of the disfavored humanity. There was no perception of the public as harboring potential geniuses. This idea was equally shared even by Anglo-American copyright where the public benefit was central, as demonstrated clearly in Lord Camden's speech before the House of Lords:

'Those great men, those favoured mortals, those sublime spirits, who share that ray of divinity which we call genius, are intrusted by Providence with the delegated power of imparting to their fellow-creatures that instruction which heaven meant for universal benefit'.<sup>343</sup>

Moreover, even though both the Anglo-American and the French doctrines shared similar rationales regarding the balance between the protection of the public domain and the author,<sup>344</sup> their terms of protection diverged nonetheless. For the *droit d'auteur* doctrine, the period of protection was now rooted in the author's life, and expanded from it. As mentioned, the French system, though created to revoke the privileges granted by its

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<sup>338</sup> Jane C. Ginsburg, 'A Tale of Two Copyrights: Literary Property in Revolutionary France and America' (1990) 64(5) *Tulane Law Review* 991, 1006.

<sup>339</sup> Gaultier, who rejected the notion of literary property, was one of the few who embraced this cumulativeness: '[e]very man owes to society the tribute of his physical and intellectual ability in exchange for that which receives from the other individuals who comprise it. The man of genius, who communicates his ideas to society, is only returning, in exchange, the product of those ideas that he has received from society' as translated in Giancarlo Frosio, *Reconciling Copyright with Cumulative Creativity, The Third Paradigm* (Edward Elgar Publishing Limited 2018) 237-233 from Jean-François Gaultier de Biauzat, *Memorandum for consultation by the Booksellers and Printers from Lyon, Rouen, Toulouse, Marseille, and Nismes, concerning book trade privileges and their prolongations* (1776) 41 < [http://www.copyrighthistory.org/cam/pdf/f\\_1776\\_2.pdf](http://www.copyrighthistory.org/cam/pdf/f_1776_2.pdf) > Accessed 3 January 2018.

<sup>340</sup> Joseph Lakanal's, *Report on the French Copyright Act*, (extract from *Moniteur universel* 1793) 868 < [http://www.copyrighthistory.org/cam/pdf/f\\_1793\\_1.pdf](http://www.copyrighthistory.org/cam/pdf/f_1793_1.pdf) > Accessed 4 January 2019.

<sup>341</sup> Before publication, Victor Hugo declared that 'the author has an undeniable and unlimited right' as quoted in Giancarlo Frosio, *Reconciling Copyright with Cumulative Creativity, The Third Paradigm* (Edward Elgar Publishing Limited 2018) 236.

<sup>342</sup> Le Chapelier declared that after the moment of publication, 'the writer has associated the public with his property, or rather he has transferred it entirely to it. Le Chapelier's Report (1791) 16 < [http://www.copyrighthistory.org/cam/pdf/f\\_1791\\_1.pdf](http://www.copyrighthistory.org/cam/pdf/f_1791_1.pdf) > Accessed 4 January 2019;

<sup>343</sup> *Donaldson v. Becket* (1774) 2 Brown's Prerogative Cases 129, 1 English Reports 837.

<sup>344</sup> See generally, arguing that Anglo-American and French doctrines were not as different as typically constructed, Jane C. Ginsburg, 'A Tale of Two Copyrights: Literary Property in Revolutionary France and America' (1990) 64(5) *Tulane Law Review*.



predecessor, was aimed at the bookseller's monopoly and not so much against its author's conception. Consequently, it seems to have inherited the author's lifetime as the reference of protection, which was clearly stronger when compared with the Anglo-American system where such inheritance did not happen. In fact, during this time, the idea that the creative work was an expression of the author's personality, from which it could not be separated, started to gain traction.<sup>345</sup> In the end, the French doctrine would pave the way for subsequent changes to copyright terms founded in individualistic notions of creativity.

Indeed, from this point on, the term of protection in the United Kingdom quickly began to increase as well. 104 years after its passing, the Statute of Anne's terms were eventually amended in 1814<sup>346</sup> to a term of 28 years or the author's life, whichever longest.<sup>347</sup> Afterwards, a heated discussion in the British Parliament began to take place as its member and judge Thomas Noon Talfourd proposed the term of copyright to be extended to the author's life plus 60 years.<sup>348</sup> Nevertheless, faced by a Parliamentary opposition commanded by the eminent Lord Macauley, Talfourd eventually compromised. Thus, in 1842, the Statute of Anne was repealed and the new term of protection now covered the author's life plus 7 years, as long as this covered more than 42 years since the first publication.<sup>349</sup> Regarding such extension, Macauley, who considered monopolies to be 'evil' (including copyright), stated: 'For the sake of the good we must submit to the evil; but the evil ought not to last a day longer than is necessary for the purpose of securing the good'.<sup>350</sup> Yet, the public's dissatisfaction with the high prices practiced by publishers became quickly heard, as books went from being affordably available to be considered a luxury.<sup>351</sup>

On the other hand, increments in the US developed at a notably slower pace, with the Copyright Act of 1831 still contemplating a period of protection of 28 years, which were renewable for another 14.<sup>352</sup> At the time, the US was focused in enjoying the exportations from foreign authors and their reprinting, which lead to a quick dissemination of books and mass education throughout the rapidly growing nation. This would remain in place until the 20<sup>th</sup> century.

However, in France, the conception of the author's work as deriving from his personality continued to be evermore supported, and this unbreakable connection of the individual's 'spirit' and his creation finally prevailed over the public's interest.<sup>353</sup> At the peak of

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<sup>345</sup> Baldwin, *The Copyright Wars* 83.

<sup>346</sup> Copyright Act of 1814, 'An Act to amend the several Acts for the Encouragement of Learning, by securing the Copies and Copyright of Printed Books, to the Authors of such Books or their Assigns'.

<sup>347</sup> Isabella Alexander, *Copyright Law and the Public Interest in the Nineteen Century* (Hart Publishing 2010) 54; Catherine Seville, *Literary copyright reform in early victorian England: the framing of the 1842 Copyright Act* (Cambridge University Press 2003) 4.

<sup>348</sup> Baldwin, *The Copyright Wars* 110.

<sup>349</sup> Copyright Act of 1842, 'An Act to amend the Law of Copyright'. 5<sup>o</sup> and 6<sup>o</sup> Victoriae C. 44, 45 Cap. XLV III < <https://goo.gl/3UBgPy> > Accessed 12 December 2018.

<sup>350</sup> Thomas Babington Macaulay, Ebook of The Miscellaneous Writings and Speeches of Lord Macaulay (Volume 4 The Project Gutenberg 2008) < <https://www.gutenberg.org/files/2170/2170-h/2170-h.htm> > Accessed 10 January 2019.

<sup>351</sup> Baldwin, *The Copyright Wars* 111.

<sup>352</sup> 'An Act to Amend the Several Acts Respecting Copyrights'. Statutes at Large 4 Stat. 436, Chapter XVI Sec. 1 and 2 < <https://goo.gl/ZNMqdU> > Accessed 12 December 2018.

<sup>353</sup> Baldwin, *The Copyright Wars* 123.

Romanticism, around the mid-nineteenth century, contributions abounded to support this view, as Freudian psychoanalysis constructed creativity as neurotic<sup>354</sup> and unpredictably emerging from conditions beyond the control of one's self, also solidifying the popular impression that creative genius was connected to mental instability.<sup>355</sup> 'Imagination' had already been forming as the venerated source of creativity,<sup>356</sup> and its relation with conscious rational effort continued to be discarded,<sup>357</sup> namely by those who would eventually support the ever-present publishers' cry for greater terms of protection.

By 14 July 1866,<sup>358</sup> France established what would become the Berne Convention's term of protection, comprising the author's life plus 50 years, and the concept of literary property was substituted by 'authors' rights', which conceptualized creativity primarily in its association with the author's individuality. Subsequently, in 1878, presided by the French writer Victor Hugo, an International Literary Congress was held in Paris to discuss the nature of literary property.<sup>359</sup> By this point, considerations for the defense of the public benefit were secondary to the importance of justly protecting the author. Hence, barely anyone had the audacity to propose shorter terms of protection, with some considering that 'the perpetuity of literary property has nothing to be scared about'.<sup>360</sup> In fact, deciding on the length of the term of protection, the First Commission adopted, by a significant majority, that it was perpetual.<sup>361</sup> This would eventually lead to, in 1886, as the culmination of an effort led by Victor Hugo,<sup>362</sup> the first multilateral copyright treaty: the Berne Convention, although it did not yet consecrate a term of protection in its text.

Nevertheless, at the end of the century, the lobbying of booksellers, now turned publishers, to center the creative process on the author's personality remained, with the insistence that author rights were natural rights.<sup>363</sup> However, this conception backfired once again as the French jurisprudence associated the privileged position of the author with the attribution of moral rights.<sup>364</sup> Afterwards, not only did the term of the author's life plus 50 years become voluntarily adoptable in the 1908 Convention,<sup>365</sup> but moral rights also became enshrined in 1928.<sup>366</sup> Notably, during Germany's Nazi regime, in which

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<sup>354</sup> Allan Hobson, *Psychodynamic Neurology: Dreams, Consciousness, and Virtual Reality* (CRC Press 2014) 33.

<sup>355</sup> R. K. Sawyer, *Explaining Creativity: The Science of Human Innovation* (2<sup>nd</sup> edition, Oxford University Press 2012) 22.

<sup>356</sup> J Engell, *The creative imagination: Enlightenment to romanticism* (Cambridge 1981) 4.

<sup>357</sup> R. K. Sawyer, *Explaining Creativity: The Science of Human Innovation* (2<sup>nd</sup> edition, Oxford University Press 2012) 22-23.

<sup>358</sup> *Loi du 14 Juillet 1866* < <https://goo.gl/YXyX1S> > Accessed 10 January 2019.

<sup>359</sup> Congrès littéraire international de Paris 1878: présidence de Victor Hugo < <https://gallica.bnf.fr/ark:/12148/bpt6k9818154d.texteImage> > Accessed 5 January 2018.

<sup>360</sup> As translated by the author: '*l'orateur pense, comme M. Ratisbonne, que la perpétuité de la propriété littéraire n'a rien d'effrayant*' in M. Tony Révillon, Congrès littéraire international de Paris 1878 48.

<sup>361</sup> '*A la majorité de onze voix, la première commission adopte, sans le formuler, le principe de la perpétuité de la propriété littéraire*' in Congrès littéraire international de Paris 1878 146.

<sup>362</sup> Ralph Oman and Lewis Flacks, 'Berne Revision: The Continuing Drama' (1993) 4(1) *Fordham Intellectual Property, Media and Entertainment Law Journal* 139, 139. Kawohl, 'The History and Philosophy of Copyright' 28; WIPO, *Learn from the Past, Create the Future. The Arts and Copyright* (WIPO 2007) 23.

<sup>363</sup> Baldwin, *The Copyright Wars* 84.

<sup>364</sup> Id 168.

<sup>365</sup> Berlin Act 1908.

<sup>366</sup> Rome Act 1928.

copyright was widely discussed, the idea of the author as a creative hero was greatly supported, although the fascist dictatorship, in fact, promoted likewise communitarian values and the author's integration in them, thus reviving the consideration for the public interest.<sup>367</sup> However, posterior discussions regarded the Nazi's heed for the strengthening of the public as 'tainted communitarianism'.<sup>368</sup> In the end, by 1948, the Convention's term of protection finally became mandatory for all signees.<sup>369</sup>

Lastly, being the UK a contracting party of the Convention and subsequent alterations since 1886, the US, opposing its signing and the *droit d'auteur* approach, remained a bastion of copyright doctrine until the second half of the 20<sup>th</sup> century. Nonetheless, as the USA went from mostly importing culture to becoming its greatest exporter, content industries, now dominated by centralized distributors to whom authors granted their rights, quickly vouched for the Convention's ideals, as their European counterparts had been doing for centuries.<sup>370</sup> With such support, namely of the rising power of Hollywood, a radical transition quickly took place, in a way that would make envious trans-Atlantic content distributors. In truth, even though foreign protection and the term granted by the author's central role in the Berne Convention was of great interest to US cultural exporters, the inseparable nature of the work from its author as interpreted in moral rights, represented an undesirable nuisance.<sup>371</sup>

Consequently, the USA adhered<sup>372</sup> to the Berne Convention in 1989 through its Implementation Act of 1988, which stated that the Convention was not 'self-executing in that existing law satisfied the United States' obligations in adhering to the Convention'.<sup>373</sup> Thus, by enacting a narrow system of moral rights protection in the Visual Artists Rights Act of 1990 (VARA),<sup>374</sup> the United States 'fulfilled' its obligations to appease criticisms of its lack of protection.<sup>375</sup> Likewise, it managed to pressure other countries to exclude moral rights from the TRIPS agreement.<sup>376</sup> This was merely, so far, the clearest representation of a long-term practice by distributors of supporting the authors' central role in the production of creative works so they could gain from its resulting greater protection.<sup>377</sup>

In the end, looking back at the evolution of terms of copyright protection, one may certainly suspect that their most recent iteration will shy away from further increases. Truthfully, the foundations created by the Berne Convention from which current terms

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<sup>367</sup> Baldwin, *The Copyright Wars* 163.

<sup>368</sup> *Id* 164.

<sup>369</sup> Brussels Act 1948 < <https://goo.gl/z9ruvC> > Accessed 13 December 2018.

<sup>370</sup> Baldwin, *The Copyright Wars* 11.

<sup>371</sup> For the rejection of the USA of moral rights, see generally: Schéré, 'Where is the Morality?'

<sup>372</sup> To be noted, the US Copyright Act of 1976 already represented a major change in the existing copyright system, and its term of protection also consisted of the author's life and fifty years after.

<sup>373</sup> *Carter v. Helmsley-Spear, Inc.* 71 F.3d 77 (2d Cir. 1995) paragraph 83, as citing S.Rep. No. 352, 100th Cong., 2d Sess. 9-10 (1988), 3706, 3714-15. < <https://casetext.com/case/carter-v-helmsley-spear-inc> > Accessed 15 January 2019.

<sup>374</sup> Visual Artists Rights Act of 1990.

<sup>375</sup> Schéré, 'Where is the Morality?' 778. Deandra Pellicore, 'Carter v. Helmsley-Spear, Inc., 71 F.3d 77 (2d Cir. 1995)' (1996) 6(2) *DePaul Journal of Art, Technology & Intellectual Property Law*

<sup>376</sup> Schéré, 'Where is the Morality?' 774.

<sup>377</sup> About the supremacy of distributors in the modern world of cultural creation, see generally: Peter Drahos and John Braithwaite, *Information Feudalism* (Earthscan Publications 2002).

have risen appear to have become unassailable. The fixation of the term of protection to the author's life and beyond is now more than 200 years old, while the Convention has contemplated its term for more than 100, making its dispute seem like a long-established matter. However, as will be seen, the conception of creativity here presented opens the search for new answers to those foundational debates over the formulation of copyright's term of protection, whose decisions have become too important to remain set in stone.

#### 4.2. The future of creativity and copyright: reconsidering the term of protection

Guided by the historical context that led to the making of the Berne Convention, another of the justifications presented for its term of protection will now be better understood. Going back to WIPO's guide on Article 7(1) of the Convention, it states that the fixation of the term of protection to the authors lifetime is because 'the Convention binds the work to its creator'.<sup>378</sup> This author-centered notion becomes seemingly paradoxical as it is followed by the extension of the term precisely beyond the author's existence. Truthfully, when Article 7(1) was constructed, a century had already passed since *droit d'auteur* fixated the term around the author's life, and its notion had become widely spread throughout the European continent.<sup>379</sup> As long as copyright debates had existed in Europe, the protection of the 'original genius' had been at the centre of it, and the discussion was now for how long his descendants would be protected.<sup>380</sup>

However, as was seen, creativity is only possible due to the combined interaction between the individual and his sociocultural context, although the latter is hardly recognized by copyright as contributing to one's work. At most, following Romanticism's notion of the endowed author granting his wisdom upon the unfavoured public, the author's social context is viewed merely as his audience. This conception and the apparently incontestable nature of granting protection beyond the authors' lifetime must be open to a reassessment when faced with some of the aspects that the presented studies of creativity reveal. Indeed, one question may be raised: how entirely and exclusively connected would the creation of a work have to be with its author, for him to be able to control its dissemination not only throughout his whole life, but for several generations after he died? The answer could be, presumably, if it was the work of an 'original genius', notwithstanding the fact that they never existed, contrary to 18<sup>th</sup> century beliefs.

In fact, as it was presented by the neuroscientific study of creativity, the author's creative work derives from the transformation of old knowledge left by his cultural heritage. However, the author, as a fundamental component of creativity himself, is not to be disregarded as he joins a long line of predecessors with his creative contribution. The author's simultaneous individual value and sociocultural dependence is the result of an

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<sup>378</sup> WIPO, *Guide to the Berne Convention* 46

<sup>379</sup> See for example, as influenced by the French Decree of 1793, Portuguese copyright even went beyond it in 1851 establishing the author's life plus 30 years, and in 1867 already consecrated a term of 50 years after the authors death. Tito Rendas, "'Para o infinito e mais além?'" 181.

<sup>380</sup> The only ones who could argue it, the British, were in such minority that in the International Congress of 1878, the English delegate simply declared he could not continue to discuss with his fellow colleagues as that would put him in conflict with his country's jurisprudence. *Congrès littéraire international de Paris 1878* 171.

emergent notion of creativity, as advocated in this thesis. Thus, what remains to be seen is how the term of protection will integrate this dual reality of the author. As it stands, it is questionable if current terms have any consideration for this continuity that permeates creative's development since primitive times. In fact, it may be argued that the extension beyond the author's life creates a counter-cycle in this line of succession, as each authors' life spent on the shoulders of giants casts two lifetimes of shadow over those trying to climb.

This is only more relevant when considering two significant findings of the study of creativity: that everyone has creative potential and that learning does not incapacitate one's acquisition of further knowledge, but rather that it potentiates it. Thus, if allowed to access it, individuals are indeed capable of producing creative contributions, whose dissemination will only strengthen others, and will be evermore ready to tackle new challenges, creating a feedback-loop of creative development. Moreover, the unparalleled capacity to share knowledge additionally increases the potential residing in the increase of accessibility. In the end, the importance of these advantages for the thriving of humanity in the Imagination Age<sup>381</sup> demands their consideration when new terms of protection are to be established. As configured by a systems notion of creativity, every strike to one of its components will affect the others. By granting increasingly higher terms of protection, the domain becomes ever harder to access, individuals end up with poorer neural networks and demotivated by their lack of instruction, while society receives fewer creative contributions. If these parameters are taken into consideration, every proposal for an increased length will have to bring strongly justified benefits to society since its heavy toll can be clearly acknowledged.

Unfortunately, copyright still seems to be built around the conception of 'eminent' creativity, as extended lengths, not efficient ones, are created to maintain a 'high level of protection',<sup>382</sup> hence made to protect those notable authors of genius, not the dissemination of knowledge throughout the public, whose idea of being capable of making a substantial contribution would go directly against the notion of the gifted author. Admittedly, such notions may have derived from genuine feelings that creativity arose from 'out of nowhere' due to the hypofrontal states one may be in when a creative idea appears. Nevertheless, as exposed herein, the prevailing mystical view of creativity may begin its process of deconstruction into a systems notion as consolidated by the findings of its neuroscientific study, which one can only hope copyright to follow.

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<sup>381</sup> Rita J. King, "The Origin of the Imagination Age" (2016), LinkedIn.

<sup>382</sup> Directive 93/98/EEC Recital 11 and 10.



## Chapter 5 - Conclusion

Humanity is currently facing ever-increasing rates of change, with technological advancements foreshadowing unpredictable scenarios. However, humans' creativity has proved, since primitive times, to be capable of facing such challenges, and the need for adaptability and innovation has been, fortunately, met with an increase in knowledge regarding creativity. For this reason, the present thesis sought to resume recent findings in the study of creativity in order to better direct copyright terms of protection towards its development. Thus, having proposed a systematic notion of creativity in conjunction with the neurobiological processes comprising creative thinking, it became established how creativity emerged from an individual and sociocultural aspect.

Subsequently, in response to one of the research questions, it was first analyzed how creativity's conception had influenced current terms of copyright protection. By establishing a common root with 175 countries in the Berne Convention, it was then studied how the Convention came to be determined by contemporary conceptions of creativity at the time of its foundation. As was seen, the Convention was mostly influenced by Romanticisms' individualistic notion of creativity, which portrayed the author as the 'original genius', being endowed with a special gift which he granted the pleasure to share with his not so favoured audience. This notion had been strongly advocated by publishers so that the authors' eventual prolonged protection would pass to them when authors sold their rights. By the time of the Convention's founding, this conception of creativity, with the individual as the sole source of its development, had already been gathering support in continental Europe for almost a century due to the French *droit d'auteur* doctrine. Consequently, the discussions prior to the Convention gathered around the protection of the author, in contrast with the Anglo-American copyright doctrine which had the public benefit at its center, granting him prolonged terms and eventually moral rights.

Having set the configuration of creativity on which the Berne Convention was founded, and from which current terms of protection would spring, a few of its basic myths were refuted by the scientific evidence presented in previous Chapters and some core concepts from which posterior terms of copyright could be guided by were presented: the configuration of creativity as emerging from the individual in conjunction with his sociocultural context, leading to the acknowledgement that a creative work does not emerge merely from the author. This opens the reconsideration of the author-centered increases in protection which have happened in past centuries, and questions the fixation of the length around the author's lifetime and beyond. Likewise, as a result of such view, the author should be regarded as belonging to a long line of predecessors, whose cycle could be interpreted to be countered by the extension of the author's control over his work for 'two lifetimes'. Additionally, the myth of the 'original genius' was equally discarded, as the neuroscientific study of creativity demonstrates that creative ideas are built from past knowledge, thus every author is influenced and uses material from previous ones. This is reinforced by the appeal to discard the persistent notion of creativity coming 'out of nowhere', whose phenomenon was also described by in Chapter 3. It was also left for reconsideration the existing conception of the public as a mere audience of eminent authors. Instead, it should be realized that everyone has creative potential, though their

motivation to pursue creative challenges will be dictated by the term's encroachment on the domain of knowledge. In any case, the proven value of effort and persistence were presented as the true ingredients of creativity, in association with the potential that learning has to further creativity and foster the acquisition of additional learning. In the end, when future discussions regarding the shaping of the term of protection arise, the debate should be done with consideration for these findings that the scientific research of creativity establishes, so that its development may be pursued in ensuing times when it will be most needed.



# Bibliography

## Books

Alexander I, *Copyright Law and the Public Interest in the Nineteen Century* (Hart Publishing 2010).

Anderson M. C, Baddeley A and Eysenck M. W, *Memory* (2<sup>nd</sup> Edition, Psychology Press 2014).

Baldwin P, *The Copyright Wars. Three Centuries of Trans-Atlantic Battle* (Princeton University Press 2014).

Bate J, *The Genius of Shakespeare* (Oxford University Press 1998).

Bechtold S and Engel C, *The Price of Moral Rights: A Field Experiment* (MPI Collective Goods 2017) < <https://ssrn.com/abstract=2941499> > Accessed 25 November 2018.

Berkowitz A. L, *The improvising mind: Cognition and creativity in the musical moment* (Oxford University Press 2010).

Bethune G. W, *Genius: An address delivered before the literary societies of Union College* (G. W. Mentz & Son 1837).

Boorstin D. J, 'The Creators. A History of Heroes of the Imagination' (Random House 1992).

Burnham D, Immanuel Kant: Aesthetics, *Internet Encyclopedia of Philosophy* < <https://www.iep.utm.edu/kantaest/#SH2d> > Accessed 20 December 2018.

Carr N, *The Shallows. What the Internet is Doing to Our Brains* (W. W. Norton & Company 2010).

Castro Caldas A, *Criatividade: a função cerebral improvável* (Universidade Católica Editora 2017).

Cowan N, *Working Memory Capacity* (Psychology Press 2005).

Cropley A.J, *Creativity* (Longmans 1967)

Darwin C, *On the Origin of Species by Means of Natural Selection or the Preservation of Favoured Races in the Struggle for Life* (ElecBook 1997, originally published in 1859).

Drahos P, *A Philosophy of Intellectual Property* (ANU eText 2016).

Dreier T and Kur A, *European Intellectual Property Law. Text, cases and materials* (Edward Elgar 2013).

Dreyfuss R and Pila J (eds) *The Oxford Handbook of Intellectual Property Law* (Oxford University Press 2018).

Duff W, *An essay on Original Genius; and its Various Modes of Exertion in Philosophy and the Fine Arts particularly in Poetry* (Edward and Charles Dilly 1767).

Ebbinghaus H, *Memory. A contribution to Experimental Psychology* (translated by Henry Ruger A and Bussenius C. E, Columbia university 1913).

Einstein A, *Autobiographical Notes* (Court Pub Co 1949, trans. and ed. P. A. Schilpp).

Erasmus Ds, *Ciceroniamus or A Dialogue on the Best Style of Speaking* (translated by Scott I, edition of 1536, Columbia University 1908).

Ericsson A and Pool R, *Peak: secrets from the new science of expertise* (Houghton Mifflin Harcourt 2016).

Fan S, Fitzallen N and Reaburn R (Eds.), *The Future of Educational Research. Perspectives from Beginning Researchers* (Sense Publishers 2014).

Frosio G, *Reconciling Copyright with Cumulative Creativity, The Third Paradigm* (Edward Elgar Publishing Limited 2018).

Fuentes A, *The Creative Spark. How Imagination Made Humans Exceptional* (Dutton 2017).

Fuster J. M, *The Prefrontal Cortex* (5<sup>th</sup> Edition Elsevier 2015).

Galanter E, Miller G. A and Pribram K. H, *Plans and the Structure of Behavior* (Holt, Rinehart and Winston 1960).

Galton F, *Hereditary Genius. An Inquiry into Its Laws and Consequences* (Barnes & Noble 2012, originally published in 1868).

Gaultier de Biauzat J-F, *Memorandum for consultation by the Booksellers and Printers from Lyon, Rouen, Toulouse, Marseille, and Nisme, concerning book trade privileges and their prolongations (1776)* < <https://goo.gl/2y9D9a> > Accessed 3 January 2018.

Gerard A, *An essay on Genius* (W Strahan 1774)

Goldberg E, *Creativity: The Human Brain in the Age of Innovation* (Oxford University Press 2018).

Gray J. A and McNaughton N, *The Neuropsychology of Anxiety: An Enquiry into the Functions of the Septo-Hippocampal System* (Oxford University Press 2000).

Graziosi B, *Inventing Homer: The Early Reception of Epic* (Cambridge University Press 2002)

Haberlandt K, *Cognitive psychology* (2<sup>nd</sup> edition, Allyn & Bacon 1997).

Handke C, *Economic Effects of Copyright. The Empirical Evidence So Far* (The Committee on the Impact of Copyright Policy on Innovation in the Digital Era 2011).

Harari Y. N, *21 Lessons for the 21<sup>st</sup> Century* (Jonathan Cape 2018).

Hardin J, *Translation and Translation Theory in Seventeenth-Century Germany* (Rodopi 1992).

Haskell J. D and Mattei U, *Research Handbook on Political Economy and Law* (Edward Elgar 2015).

Hauser A, *The Social History of Art. Vol. II. Renaissance, Manneirism Baroque* (Routledge & Kegan Paul 1962).

Jacobs K. M, 'Neocortex' *Encyclopedia of Clinical Neuropsychology* (Springer 2011).

Jenkins P, *The Great and Holy War: How World War I became a religious crusade* (Harper One 2015).

Johnson S, *Where Good Ideas Come From. The Natural History of Innovation* (Riverhead Books 2010).

Kahneman D, *Thinking Fast and Slow* (Farrar, Straus and Giroux (2011).

Kandel E and Squire L, *Memory: From mind to molecules* (Scientific American Library 1999).

Kandel, *In Search of Memory* (2006)

Kant I, *The Critique of Judgment* (Macmillan 1914), 192-193  
<http://oll.libertyfund.org/titles/1217>

Kaufman P, *Essays in memory of Barrett Wendell* (Harvard University Press 1926).

Klingberg T, *The Overflowing Brain: Information Overload and the Limits of Working Memory* (translated by Neil Betteridge Oxford University Press, 2009).

Koerner J. L, *The Moment of Self-Portraiture in German Renaissance Art* (University of Chicago Press 1993).

Lagbaine G, *Momus Triumphans: or, The Plagiaries of the English Stage; Expos'd in a Catalogue* (Nicholas Cox 1688) <  
<https://babel.hathitrust.org/cgi/pt?id=osu.32435018427773;view=1up;seq=12> >  
 Accessed 20 December 2018.

Lakanal's J, *Report on the French Copyright Act*, (extract from *Moniteur universel* 1793)  
 < [http://www.copyrighthistory.org/cam/pdf/f\\_1793\\_1.pdf](http://www.copyrighthistory.org/cam/pdf/f_1793_1.pdf) > Accessed 4 January 2019.

Lauder W, *An essay on Milton's Use and Imitation of the Moderns, in His Paradise Lost* (J. Payne and J. Bouquet 1750).

May C and Sell S. K, *Intellectual Property Rights. A Critical History* (Lynne Rienner 2006).

Miles C. C, *Genetic studies of genius: Vol.2. The early mental traits of three hundred geniuses* (Stanford University Press 1926).

Miyake A and Shah P (eds.), *Models of Working Memory. Mechanisms of Active Maintenance and Executive Control* (Cambridge University Press 1999).

Müller G. E. and Pilzecker A, *Experimentelle Beiträge zur Lehre vom Gedächtniss* (Verlag von Johann Ambrosius Barth 1900).

Nicolson A, *Why Homer Matters* (Henry Holt and Company 2014)

Patterson L. R, *Copyright in Historical Perspective* (Vanderbilt University Press 1968).

Plato, *The Republic Book X* < [https://en.wikisource.org/wiki/The\\_Republic/Book\\_X](https://en.wikisource.org/wiki/The_Republic/Book_X) >

Plutarch, Pericles, translated by John Dryden II 2 <  
<https://people.ucalgary.ca/~vandersp/Courses/texts/plutarch/plutperi.html#II> > Accessed

Poincare H, The Value of Science. Essential Writings of Henri Poincare (Random House 2001) 220.

Reiff A, 'Interpretatio, imitatio, aemulatio: Begriff und Vorstellung literarischer Abhängigkeit bei den Römern' (Druck Tritsch 1959).

Rose M, Authors and Owners: The invention of Copyright (Harvard University Press 1993).

Sawyer R. K, Explaining creativity. The Science of Human Innovation (Oxford University Press 2006).

Seville C, Literary copyright reform in early victorian England: the framing of the 1842 Copyright Act (Cambridge University Press 2003).

Sweller J, Instructional Design in Technical Areas (Australian Council for Educational Research 1999).

Tchaikovsky M. I, The Life & Letters of Peter Ilich Tchaikovsky (University Press of the Pacific 2004).

Teilmann S, British and French Copyright: A Historical Study of Aesthetic Implications (Copenhagen: Djøf Publishing, 2009).

Tully J (ed), 'Meaning and Context: Quentin Skinner and his Critics' (Princeton, 1988).

Vansina J, Oral Tradition as History (University of Wisconsin Press 1985).

Young E, Conjectures On Original Composition. In a Letter to the Author of Sir Charles Grandison (A. Millar and R. and J Dodsley 1759).

## Articles

Acar S, Burnett C and Cabra J. F, 'Ingredients of Creativity: Originality and More' (2017) Creativity Research Journal.

Albert R. S and Runco M. A, 'A history of research on creativity' in Sternberg R. J (Ed.), *Handbook of creativity* (Cambridge University Press 1998).

Albert R. S and Runco M. A, 'Creativity Research. A Historical View' in Kaufman J. C and Sternberg R. J, *The Cambridge Handbook of Creativity* (Cambridge University Press 2010).

Alvarez P and Squire L. R, 'Retrograde Amnesia and Memory Consolidation: A Neurobiological Perspective', *Current Opinion in Neurobiology* (1995).

Amabile T and Pillemer J, 'Perspectives on the social psychology of creativity', *Journal of Creative Behavior*.

Amir O and Biederman I, 'The Neural Correlates of Humor Creativity', *Frontiers in Human Neuroscience*.

Arden R, Chavez R. S, Grazioplene R and Jung R. E, 'Neuroimaging creativity: A psychometric view' (2010) *Behav Brain Res*.

Arnsten A. F.T, Gamo N. J, Paspalas C. D, Yang Y and Wang M, 'Dynamic Network Connectivity: A New Form of Neuroplasticity' (2010) *Trends Cogn Sci*.

Arnsten A.F.T., Paspalas C. D and Wang M. J, 'Neuromodulation of Thought: Flexibilities and Vulnerabilities in Prefrontal Cortical Network Synapses' (2012).

Ashok A, 'Moral Rights – TRIPS and Beyond: The Indian Slant' (2013) *J. COPYRIGHT SOC'Y U.S.A.*

Baas M, De Dreu C. K, Nijstad B. A, Roskes M and Wolsink I, 'Working memory benefits creative insight, musical improvisation, and original ideation through maintained task-focused attention' (2012).

Baddeley A, 'The episodic buffer: a new component of working memory?' (2000).

Baddeley A.D and Hitch G, 'Working memory' in Bower G. H. (Ed.), *The psychology of learning and motivation: Advances in research and theory* (New York: Academic Press 1974) vol 8.

Baer J and Kaufman J. C, 'Beyond New and Appropriate: Who Decides What Is Creative?' (2012) *Creativity Research Journal*.

Barron F, 'The disposition toward originality' (1955) *Journal of Abnormal and Social Psychology*.

Beaty R. E, Benedek M, Schacter D. L and Silvia P. J, 'Creative Cognition and Brain Network Dynamics' (2016).

Beghetto R. A and Kaufman J. C, 'Beyond Big and Little: The Four C Model of Creativity' (2009).

Bekkers J. M., 'Pyramidal neurons' (2011)

Belluck P and Kolata G, 'Why are scientists so upset about the first crispr babies?' (5 December 2018), *The New York Times* <<https://www.nytimes.com/2018/12/05/health/crispr-gene-editing-embryos.html>>

Benedek M, Dunst B, Jauk E, and Neubauer A. C, 'The relationship between intelligence and creativity: New support for the threshold hypothesis by means of empirical breakpoint detection' (2013).

Bently L, Deazley and R Kretschmer M, 'Introduction. The History of Copyright History: Notes from an Emerging Discipline' (2010) in Bently L, Deazley R and Kretschmer M (eds) *Privilege and Property Essays on the History of Copyright* (Cambridge Open Book Publishers 2010).

Bhattacharya J, Pereda E and Reiterer S, 'Measuring second language proficiency with EEG synchronization: How functional cortical networks and hemispheric involvement differ as a function of proficiency in second language speakers' (2009).

Boden M. A, 'Creativity as a Neuroscientific Mystery' in Vartanian O, Bristol A. S, and Kaufman J. C, *Neuroscience of Creativity* (MIT Press 2013).

Born J and Diekelmann S, 'One memory, two ways to consolidate?' (2007) *Nature Neuroscience*.

Born J and Diekelmann S and Wilhelm I, 'System consolidation of memory during sleep' (2012) *Psychological Research* (2012).

Boyd R, Henrich J and Richerson P. J, 'The cultural niche: Why social learning is essential for human adaptation' (2011).

Braverman I, 'Editing the Environment: Emerging Issues in Genetics and the Law' (2017), University at Buffalo School of Law Legal Studies Research Paper No. 2017-005.

Bridge D. J, Chiao J. Y and Paller K. A, 'Emotional context at learning systematically biases memory for facial information' (2010).

Bridge D. J and Voss J. L 'Active retrieval facilitates across-episode binding by modulating the content of memory' (2014).

Brown J, Cooper-Kuhn CM, Gage FH, Kemperman G, van Praag H, Winkler J, 'Enriched environment and physical activity stimulate hippocampal but not olfactory bulb neurogenesis' (2003).

Bruce, C.J, Funahashi, S and Goldman-Rakic, P.S., 'Mnemonic coding of visual space in the monkey's dorsolateral prefrontal cortex' (1989).

Bundgaard M. J, Gundersenb H. J. G, Marnera L, Nyengaardb J. R Pakkenberg B, Pelviga D and Regeura L, 'Aging and the human neocortex' (2003) *Experimental Gerontology*.

Byrne R. M. J and Murray M. A, 'Attention and working memory in insight problem-solving' in *Proceedings of the Twenty-Seventh Annual Conference of the Cognitive Science Society*.

Charness G and Grieco D 'Creativity and Financial Incentives' (2018) *Journal of the European Economic Association*.

Chen Q, Feng J, Jiao Z, Qiu J, Liu Z, Rolls E. T, Sun J, Xie X, Zhang J and Zhang K 'Neural and genetic determinants of creativity' (2018).

Christiansen M. H and Kirby S, 'Language Evolution: The Hardest Problem in Science?' in Christiansen M. H and Kirby S (eds.) *Language Evolution* (Oxford University Press 2003).

Chui M, Manyika J and Miremadi M, 'Where machines could replace humans—and where they can't (yet)?' (2016), *McKinsey Quarterly*.

Cohen NJ and Squire LR, 'Preserved learning and retention of pattern-analyzing skill in amnesia: dissociation of knowing how and knowing that' (1980).

Corazza G. E, Vanelli-Coralli A and Pedone R, 'Technology as a Need: Trends in the Evolving Information Society' (2010) *Advances in Electronics and Telecommunications*.

- Corazza G. E, 'Potential Originality and Effectiveness: The Dynamic Definition of Creativity' (2016) *Creativity Research Journal*.
- Corazza G. E, 'The Magical Mystery Four: How is Working Memory Capacity Limited, and Why?' 19(1) *Curr Dir Psychol Sci*. 2010.
- Cropper S. J, Little D. R, Roze K and Webb M. E 'The contributions of convergent thinking, divergent thinking, and schizotypy to solving insight and noninsight problems' (2017).
- Crowell S. E, 'The Neurobiology of Declarative Memory' in Schumann J. H., Crowell S. E, Jones N. E, Lee N, Schuchert S. A and Wood L. A., *The Neurobiology of Learning: Perspectives from Second Language Acquisition* (Lawrence Erlbaum 2004).
- Csikszentmihalyi M, 'Society, Culture and Person: A Systems View of Creativity', in Sternberg R (ed) *The Nature of Creativity* (Cambridge University Press 1988).
- Csikszentmihalyi M, *Creativity: Flow and the Psychology of Discovery and Invention* (HarperCollins 1997).
- Csikszentmihalyi M, 'Implications of a Systems Perspective for the Study of Creativity' in Sternberg R (ed) *Handbook of Creativity* (first published 1999, Cambridge University Press 2009).
- Deci E. L and Ryan R. M, 'Self-Determination Theory and the Facilitation of Intrinsic Motivation, Social Development, and Well-Being' (2000).
- Desmond J. E, Gabrieli J. D. E and Poldrack R. A 'The role of left prefrontal cortex in language and memory' (1998) *Proc. Natl. Acad. Sci*.
- D'Esposito M, 'From cognitive to neural models of working memory' (2008) *Philosophical Transactions of the Royal Society of London Series B*.
- Diderot D, 'Letter on the Book Trade (Excerpts selected and translated by Arthur Goldhammer)' (2002) *Daedalus On Intellectual Property*.
- Dietrich A, 'The cognitive neuroscience of creativity' (2004) *Psychonomic Bulletin & Review*.
- Dietrich A, 'Transient Hypofrontality as a Mechanism for the Psychological Effects of Exercise' (2006) *Psychiatry Research*.
- Dietrich A and Kanso R, 'A Review of EEG, ERP, and Neuroimaging Studies of Creativity and Insight' (2010) *Psychological Bulletin*.
- Dolan R and Frit C. D, 'The role of the prefrontal cortex in higher cognitive functions' (1996) *Cognitive Brain Research*.
- Domenico S. I. Di and Ryan R. M, 'The Emerging Neuroscience of Intrinsic Motivation: A New Frontier in Self-Determination Research' (2017).
- Donner I, 'The Copyright Clause of the U.S. Constitution: Why Did the Framers Include It With Unanimous Approval?' (1992) *The American Journal of Legal History*.

- Doppelmayr M, Klimesch W, Sauseng P and Schabus M, 'Fronto-parietal EEG coherence in theta and upper alpha reflect central executive functions of working memory' (2005).
- Dreyfuss R and Pila J, 'Intellectual Property Law: An Anatomical Review' (2018) in Dreyfuss R and Pila J (eds) *The Oxford Handbook of Intellectual Property Law* (Oxford University Press 2018).
- Drucker P. F, 'The Rise of the Knowledge Society' (1993), WQ Spring.
- Falk A and Fehr E, 'Psychological Foundations of Incentives' (2002) CEPR Discussion Paper No. 3185. < <https://ssrn.com/abstract=301322> > Accessed 24 November 2018.
- Fernández-Castilla B, Kyndt E, Noortgate W Van den and Said-Metwaly S, 'The Factor Structure of the Figural Torrance Tests of Creative Thinking: A Meta-Confirmatory Factor Analysis' (2018) *Creativity Research Journal*.
- Flacks L and Oman R, 'Berne Revision: The Continuing Drama' (1993) *Fordham Intellectual Property, Media and Entertainment Law Journal*.
- Flexner L. B, Flexner J. B and Roberts R. B, 'Memory in Mice Analyzed with Antibiotics' (1967).
- Foundation L, 'The Lion Man. A Telling Bone' < <https://www.lowenmensch.org/wp-content/uploads/2017/05/LionMan-PDF.pdf> > Accessed 17 August 2018.
- Fried I, Ison M. J and Quiroga R.Q, 'Rapid Encoding of New Memories by Individual Neurons in the Human Brain' (2015).
- Fulton J and Paton E, 'The Systems Model of Creativity' in McIntyre P, Fulton J and Paton E (eds) *The Creative System in Action. Understanding Cultural Production and Practice* (Palgrave Macmillan 2016).
- Fuster, J. M. 'Frontal lobe and cognitive development' (2002) *Journal of Neurocytology*.
- Gabora L, 'Revenge of the 'neurds': Characterizing creative thoughts in terms of the structure and dynamics of memory' (2010) *Creativity Research Journal*.
- Garcia-Vega C and Walsh V, 'Polymathy: The Resurrection of Renaissance Man and the Renaissance Brain' in Jung R. E and Vartanian O (eds), *The Cambridge Handbook of the Neuroscience of Creativity* (Cambridge University Press 2018).
- Gervais D. J, 'Feist goes global: a comparative analysis of the notion of originality in copyright law' (2002) *Journal of the Copyright Society of the U.S.A.*
- Gilbert P. F. C., 'An outline of brain function' (2001) *12 Cognitive Brain Research*.
- Ginsburg J. C, 'A Tale of Two Copyrights: Literary Property in Revolutionary France and America' (1990) *Tulane Law Review*.
- Goldman-Rakic P. S and Selemon L.D, 'Common Cortical and Subcortical Targets of the Dorsolateral Prefrontal and Posterior Parietal Cortices in the Rhesus Monkey: Evidence for a Distributed Neural Network Subserving Spatially Guided Behavior' (1988) *Journal of Neuroscience*.
- Goldman-Rakic P. S, 'Cellular Basis of Working Memory' (1995) *14(3) Neuron* 477.



Goldman-Rakic P. S, 'The prefrontal landscape: implications of functional architecture for understanding human mentation and the central executive' (1996) *Philos. Trans. R. Soc. Lond. B Biol. Sci.*

Griffin J, *The Economic Impact of Copyright (Public Knowledge)* available < <https://www.publicknowledge.org/files/TPP%20Econ%20Presentation.pdf> > Accessed in 26 November 2018.

Guilford JP, 'The structure of intellect' (1956) 53(4) *Psychological Bulletin* 267.

Gurry F, 'Building respect for intellectual property – stimulating innovation and creativity' (2016), *WIPO Magazine*, Special issue 11/2016.

Hauhart R. C, 'Natural Law Basis for the Copyright Doctrine of *Droit Moral*' (1985) *The Catholic Lawyer*.

Hayes J. R, 'Cognitive Processes in Creativity', in Glover J. A., Ronning R. R, Reynolds C. R (eds.), *Handbook of Creativity* (Springer 1989).

Hedblom M. M, 'The Role of Working Memory in Creative Insight: Correlation analysis of working memory capacity, creative insight and divergent thinking' (2013) < <https://goo.gl/mCkGhW> > Accessed 10 January 2019;

Herculano-Houzel S, 'The human brain in numbers: a linearly scaled-up primate brain' (2009) *Front Hum Neurosci*.

Hilbert M and López P, 'The World's Technological Capacity to Store, Communicate, and Computer Information' (2011).

Hines T, 'Neuromythology of Einstein's brain' (2014) 88 *Brain Cogn.* 21.

d'Inverno M and Still A, 'A History of Creativity for Future AI Research' (2016) *Proceedings of the Seventh International Conference on Computational Creativity*.

Jaeger R, 'The Standard Definition of Creativity' 24(1) *Creativity Research Journal* 92.

Jerskey B. A and Sweet L. H, 'Working memory' in Jeffrey S. Kreutzer John DeLuca Bruce Caplan (eds), *Encyclopedia of Clinical Neuropsychology* (Springer 2<sup>nd</sup> edition 2018)

Joseph Addison, 'On Genius' (1711), *The Spectator*.

Jung R. E and Vartanian O, 'Introduction' Jung R. E and Vartanian O (eds), *The Cambridge Handbook of the Neuroscience of Creativity* (Cambridge University Press 2018).

Kamp J van der, Memmert D and Moraru A, 'Motor creativity: the roles of attention breadth and working memory in a divergent doing task', *Journal of Cognitive Psychology*.

Kandel E. R, 'The Molecular Biology of Memory Storage: A Dialog Between Genes and Synapses' (2000) *Bioscience Reports*.

Kaufman A. S, 'Many Pathways, One Destination. IQ Tests, Intelligent Testing, and the Continual Push for More Equitable Assessments' in Sternberg R. J. (ed) *The Nature of Human Intelligence*.

- Kawohl F, 'The History and Philosophy of Copyright' (2004) in Frith S and Marshall L (ed.) Music and Copyright (University Press 2004).
- Kim K. H, 'Can We Trust Creativity Tests? A Review of the Torrance Tests of Creative Thinking (TTCT)' (2006) Creativity Research Journal.
- Kim K. H, 'The Creativity Crisis: The Decrease in Creative Thinking Scores on the Torrance Tests of Creative Thinking', Creativity Research Journal.
- King R. J., 'The Origin of the Imagination Age' (2016), LinkedIn.
- Kowatari Y, Lee S. H, Yamamura H, Nagamori Y, Levy P, Yamane S and Yamamoto M, 'Neural Networks Involved in Artistic Creativity' (2009) Human Brain Mapping.
- Kurzweil R, 'The Law of Accelerating Returns' (2007) <http://www.kurzweilai.net/the-law-of-accelerating-returns>>
- Lake M, 'Homo: the creative genus?' in Mithen S (ed), Creativity in Human Evolution and PreHistory (Routledge 1998).
- Le Chapelier's Report (1791) < [http://www.copyrighthistory.org/cam/pdf/f\\_1791\\_1.pdf](http://www.copyrighthistory.org/cam/pdf/f_1791_1.pdf) >
- Lechner H. A, Squire L R and Byrne J. H, '100 Years of Consolidation - Remembering Müller and Pilzecker' (1999) Learning & Memory.
- Lee D and Seo H., 'Behavioral and neural changes after gains and losses of conditioned reinforcers' (2009).
- Lehrer J, 'The Eureka Hunt' The New Yorker (July 28 2008).
- MacKinnon D. W, 'The personality correlates of creativity: A study of American architects' in Vernon P. E (Ed.), Creativity (Penguin 1970).
- Magee C, 'The Age of Imagination. Coming Soon to a Civilization Near You' (1993), Second International Symposium: National Security & National Competitiveness: Open Source Solutions
- McCormick C, Rosenthal C. R, Miller T. D and Maguire E. A, 'Mind-Wandering in People with Hippocampal Damage' (2018) Journal of Neuroscience.
- McKamey M, Legal Technology 'Artificial Intelligence and the Future of Law Practice' (2017) Appeal Law Journal.
- Miller G. A., 'The Magical Number Seven, Plus or Minus Two Some Limits on Our Capacity for Processing Information', Psychological Review.
- Minton H. L, 'Charting life history: Lewis M. Terman's study of the gifted' in Morawski J. G (Ed.), The rise of experimentation in American psychology (Yale University Press 1988).
- Mithen S, 'A creative explosion? Theory of mind, language and the disembodied mind of the Upper Palaeolithic' in Mithen S (ed), Creativity in Human Evolution and PreHistory (Routledge 1998).

Moore G. E, 'Cramming more components onto integrated circuits' (1998) Proceedings of the IEEE.

Moran S, 'Creativity in school. In K. S. Littleton' in Wood C, Staarman J. K (eds), International handbook of educational psychology: New perspective on learning and teaching. (Emerald 2010).

M P, 'How your memory rewrites the past' (February 04, 2014 Northwestern Now) < <https://news.northwestern.edu/stories/2014/02/how-your-memory-rewrites-the-past>> Accessed 15 November 2018.

Nguyen T, 'Total Number of Synapses in the Adult Human Neocortex' (2010) Undergraduate Journal of Mathematical Modeling: One + Two.

Norton J. D, 'How Hume and Mach Helped Einstein Find Special Relativity' (2004) in Dickson M and Domski M (eds), Synthesis and the Growth of Knowledge: Essays at the Intersection of History, Philosophy, Science, and Mathematics (Open Court, forthcoming).

Oxman N, 'Age of Entanglement' (2016) Design and Science < <https://jods.mitpress.mit.edu/pub/AgeOfEntanglement> > Accessed 5 January 2018.

Park N. K, Youngshin Chun M and Lee J, 'Revisiting Individual Creativity Assessment: Triangulation in Subjective and Objective Assessment Methods' (2016) Creativity Research Journal.

Paul M, 'How your memory rewrites the past' (February 04, 2014 Northwestern Now) < <https://news.northwestern.edu/stories/2014/02/how-your-memory-rewrites-the-past> > Accessed 15 November 2018.

Ramón y Cajal, 'Neuvo concepto de la histologia de los centros nerviosos' (1893) Rev Cienc Méd Barcelona.

Rendas T, "'Para o infinito e mais além?'" O prazo de protecção do direito de autor.' (2015) in IICM – Instituto Internacional Casa de Mateus et al, Infinito (Cadernos Mateus DOC 2015).

Rentas N W, 'Moral Rights Exclusion in the North American Free Trade Agreement and the General Agreement on Tariff and Trade: A Legal Proposal for the Inclusion of Moral Rights in Future Free Trade Agreements in Latin America and the Caribbean' (1996) Revista de Derecho Puertorriqueño.

Reuveni E, 'Copyright, Neuroscience, and Creativity' (2013), Alabama Law Review Vol. 735.

Richardson K, 'What IQ Tests Test' (2002) 117 Theory & Psychology 219.

Richter F. R and Yeung N, 'ERP Correlates of Encoding Success and Encoding Selectivity in Attention Switching' (2016) PLOS ONE < <https://doi.org/10.1371/journal.pone.0167396> >

Risko E. F, Schacter D. L, Seli P and Smilek D, 'Mind-Wandering With and Without Intention' (2016) Trends Cogn Sci. August.

Root-Bernstein R, 'Multiple Giftedness in Adults: The Case of Polymaths' (2009), International Handbook on Giftedness. Doi: 10.1007/978-1-4020-6162-2\_42 Accessed 25 April 2018.

Root-Bernstein R, 'The art of innovation: Polymaths and universality of the creative process' in Shavinina L.V. (ed), The international handbook of innovation (Oxford University Press 2003).

Rose M, 'The Public Sphere and the Emergence of Copyright: *Areopagitica*, the Stationers' Company and the Statute of Anne' (2010) in Deazley R, Kretschmer M and Bently L (eds), Privilege and Property. Essays on the History of Copyright (2010 Cambridge: Open Book Publishers).

Rubenson D. L and Runco M. A, 'The psychoeconomic view of creative work in groups and organizations' (1995) Creativity and Innovation Management.

Runco M. A, 'Creativity research: Originality, utility, and integration' (1988) 1(1) Creativity Research Journal 1.

Runco M. A, 'Education for Creative Potential' (2003) 47 Scandinavian Journal of Educational Research 317.

Runco M. A, 'Everyone has creative potential' in Sternberg R. J., Grigorenko E. L and Singer J. L (eds), Creativity: From potential to realization (American Psychological Association 2004).

Schéré E, 'Where is the Morality? Moral Rights in International Intellectual Property and Trade Law' (2018) Fordham International Law Journal.

Simonton D. K, 'Creative Development as Acquired Expertise: Theoretical Issues and an Empirical Test' (2000) Developmental Review.

Simonton D. K, 'Domain-general creativity: On producing original, useful, and surprising combinations' in Baer J, Glăveanu V. P and Kaufman J. C (eds), Cambridge handbook of creativity across different domains (Cambridge University Press 2017).

Simonton D. K, 'Creative Ideas and the Creative Process: Good News and Bad News for the Neuroscience of Creativity' in Jung R. E and Vartanian O (eds), The Cambridge Handbook of the Neuroscience of Creativity (Cambridge University Press 2018).

Skinner Q, 'History and Ideology in the English Revolution' The Historical Journal (1965)

Somsen H, 'The End of European Union Environmental Law: An Environmental Programme for the Anthropocene'.

Spencer J, '7 ways to inspire divergent thinking in the classroom' (March 25 2018), Medium <<https://goo.gl/6JLXAk>> Accessed 25 June 2018.

Spruston N, 'Pyramidal neurons: dendritic structure and synaptic integration' (2008) Nature Reviews Neuroscience.

Spruston N, Zola-Morgan S, 'The medial temporary lobe memory system' (1991).

Squire L. R, 'The Legacy of Patient H.M. for Neuroscience' (2009).

- Stein M. I, 'Creativity and culture' (1953) *Journal of Psychology*.
- Sternberg R. J, 'Creative Giftedness Is Not Just What Creativity Tests Test: Implications of a Triangular Theory of Creativity for Understanding Creative Giftedness' (2018) Roesper Review.
- Strogatz S. H and Watts D. J 'Collective dynamics of 'small-world' networks' (1998).
- Torrance E. P, 'The nature of creativity as manifest in its testing' (1988) in Sternberg R. J (ed), *The nature of creativity* (Cambridge University Press 1988).
- Treffert D. A, 'The savant syndrome: an extraordinary condition. A synopsis: past, present, future' (2009) *Philos. Trans. R. Soc. Lond. B. Biol. Sci*.
- Watt R, 'An Empirical Analysis of the Economics of Copyright: how valid are the results of studies in developed countries for developing countries?' (2009) in WIPO, *The Economics of Intellectual Property. Suggestions for Further Research in Developing Countries and Countries with Economies in Transition* (WIPO 2009).
- Welch C. B, "'Anti-Benthamism": Utilitarianism and the French Liberal Tradition' (2012) Geenens R and Rosenblatt H *French Liberalism from Montesquieu to the Present Day* (Cambridge University Press 2012).
- West M, 'The Homeric Question Today' (2011) *Proceedings of the American Philosophical Society*.
- Woodmansee M, 'The Genius and the Copyright: Economic and Legal Conditions of the Emergence of the Author' (1984) *Eighteenth-Century Studies*.
- Worrall S, 'Author Says a Whole Culture – Not a Single 'Homer' – Wrote 'Illiad', 'Odyssey' (National Geographic January 3, 2015) < <https://goo.gl/nfdvRk> > Accessed 20 December 2018.
- Yarbrough N. D, 'Assessment of Creative Thinking Across Cultures Using the Torrance Tests of Creative Thinking (TTCT): Translation and Validity Issues' (2016) *Creativity Research Journal*.
- Yuana P and Raza N, 'Prefrontal Cortex and Executive Functions in Healthy Adults: A Meta-Analysis of Structural Neuroimaging Studies' (2014) *Neurosci Biobehav Rev*.
- Zeigler D, 'Evolution and the Cumulative Nature of Science' *Evo Edu Outreach* (2012).
- Ziolkowski J, 'The Highest Form of Compliment: Imitatio in the Medieval Latin Culture' in Marenbon J (ed.), *Poetry and Philosophy in the Middle Ages: A Festschrift for Peter Dronke* (Brill 2001).

## Case Law

- Donaldson v. Becket (1774) 2 Brown's Prerogative Cases 129, 1 English Reports.
- Eric Aldred, et al. v. John Ashcroft, Attorney General 537 US (2003).
- Carter v. Helmsley-Spear, Inc. 71 F.3d 77 (2d Cir. 1995).

## Legislation

Acte de Berlin 1908 < <https://goo.gl/1s3Jzv> > Accessed 13 December 2018.

Act to Amend the Several Acts Respecting Copyrights'. Statues at Large 4 Stat. < <https://goo.gl/ZNMqdU> > Accessed 12 December 2018.

Agreement on Trade-Related Aspects of Intellectual Property Rights («TRIPS»).

Arrest du Conseil d'Etat du Roi, Portant Règlement sur la durée des Privilèges en Librairie (30 August 1777) < [http://www.copyrighthistory.org/record/f\\_1777a](http://www.copyrighthistory.org/record/f_1777a) > Accessed 3 January 2018.

Berne Convention for the Protection of Literary and Artistic Works as amended on September 28, 1979 («Berne Convention»).

Brussels Act 1948 < <https://goo.gl/z9ruvC> > Accessed 13 December 2018.

Copyright Act of 1790.

Copyright Term Extension Act 1998.

Copyright Act of 1814, 'An Act to amend the several Acts for the Encouragement of Learning, by securing the Copies and Copyright of Printed Books, to the Authors of such Books or their Assigns'.

Copyright Act of 1842, 'An Act to amend the Law of Copyright'. < <https://goo.gl/3UBgPy> > Accessed 12 December 2018.

Decree of 19-24 July 1793, Décret de la Convention Nationale, Du 19 Juillet 1793, l'an fecond de la République Française, Relatif aux droits de propriété des auteurs d'écrits en tout genre, des compositeurs de musique, des peintres et dessinateurs available in < [https://archive.org/details/dcretdeconvent00fran\\_3](https://archive.org/details/dcretdeconvent00fran_3) > ccessed 24 November 2018.

Decrees of 13-19 January 1791 and 19 July – 6 October 1791.

Décret de la Convention Nationale du dix-neuf juillet 1793 relatif aux droits de propriété des Auteurs d'écrits en tout genre, des Compositeurs de musique, des Peintres et des Dessinateurs.

Directive 93/98/EEC.

Directive 96/9/EC Chapter III.

Directive 2004/48/EC.

Directive 2006/116/EC as amended by Directive 2011/77/EU.

Directive 2016/0280.

French Intellectual Property Code (amended 2018 by Law No. 2018-670).

Rome Convention 1961.

Statutes of the Realm (Record Commission 1810-1825).

The United States Constitution 1787.

UK Copyright, Designs and Patents Act (1988 C.48).

US Copyright Act of 1976.