


*IS THE INTELLECTUAL PROPERTY  
DOMAIN TRULY READY, WILLING,  
AND ABLE AND TO ACCOMMODATE  
ARTIFICIAL INTELLIGENCE?*

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## **Abstract**

Artificial intelligence (AI) development has largely been in a vacuum, with a severe lack of state intervention or regulation, creating an incentivising environment for research and development without legal constraint. Contemporary developments within advanced machine learning techniques like deep neural networks imitate the human brain facilitating cognitive abilities; inevitably presenting innovative solutions to traditional problems, generating novel creations never before conceived. Despite the increasingly prominent socio-technological landscape, the autonomous nature conflict with fundamental norms of intellectual property. (IP) law. The copyright has proven incompatible with developments and the UK IPO position has exacerbated the latency to modernity. The result of this; legal uncertainty and chilling efforts to control innovation and investment in AI development. Despite a canopy of international laws harbouring a notion of collective recognition OF IP rights, nations have different legal and judicial strategies which hinder any attempts at homogenisation of intellectual property laws. This further fragments the geo-political landscape; actively obstructs the effective lateral transfer of information and technological advancement; and further extends the economic gap between nations. It is acknowledged that despite this, IPRs are of social and economic importance, resulting in a need for analysis on the current regime and its ability to suitably protect and regulate AI. Answers to these modern challenges will require modern approaches. This paper utilises legal, sociological, and economic data to deconstruct concepts and compare differing jurisdictional approaches in order to Identify the main challenges at the intersection of IP and AI. It will then present and evaluate the validity of approaches towards sovereignty and effective technological leadership.

## **Chapter 1: Introduction**

### **1.1 Background**

This study stems from the premise that intellectual property rights (IPRs) comprise an area of primary and social importance; an essential incentive for innovation in capitalist economies.<sup>1</sup> The monopoly powers afforded therein have been of continuing importance since the industrial revolution, providing a guarantee that a creator can recoup his investment by stopping competitors, attracting investment, and facilitating licence agreements.<sup>2</sup> This in turn provides long-term strategic opportunities, enabling companies to grow and innovation to flourish.<sup>3</sup> It is unreasonable to expect markets to deliver a just, acceptable, and efficient output, therefore, by protecting the application of ideas and information with commercial value, the policy aims to balance the market failure that may naturally arise in absence of these exclusivity rights.<sup>4</sup> Understandably, there is a need for government intervention to balance the protection and reward against the allocation of risk and ensure optimal lateral transfer of information among society. Though, in order for this to occur, the legislative framework must be precise, technically ascertainable, and suitable to technological advancement.

Across the globe there exists increasing recognition of the role artificial intelligence (AI) has to play across all industry sectors; as evidenced by its identification from the UK

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<sup>1</sup> L Bentley, and J Sherman J, *Intellectual Property Law* (3rd Ed 2009) p3,1.

<sup>2</sup> O Granstrand, 'Innovation and Intellectual Property Rights' (2006) *Business and Management, Innovation, Government and Law*, 10; Jan Fagerberg, David C. Mowery, Richard R. Nelson, 'The Oxford Handbook of Innovation' (OUP 2006) p267.

<sup>3</sup> A Cavell 'Tesla: Driving battery development differently' *Research-Technology Management* 97:2. <<https://www.mewburn.com/news-insights/tesla-driving-battery-development-differently>> accessed July 2020.

<sup>4</sup> See No.2 at 3,1.

government as one of the four grand challenges that will transform the future.<sup>5</sup> Estimates say AI will add £232 billion to the global economy within the next decade.<sup>6</sup> Theoretically, any process currently performed by homosapiens is capable of automation through AI technology.<sup>7</sup> In recognition of the economic and societal disruption, the Government is investing heavily into developing applications for AI and data-driven innovation.<sup>8</sup> Such which would drive efficiencies, boost productivity and accelerate innovation by enhancing computational processes and support human decision making.<sup>9</sup> The exponential surge in the generation of social data drives demand for advanced digital infrastructures to utilise and exploit this data; in turn bringing fascinating wide-ranging research and developments which are equally deserving of protection and dissemination to the public.<sup>10</sup> Although, the emerging technology dominance

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<sup>5</sup> Department for Business, Energy & Industrial Strategy, 'Policy paper: The Grand Challenges' (22 May 2019) Available at <<https://www.gov.uk/government/publications/industrial-strategy-the-grand-challenges/industrialstrategy-the-grand-challenges>> accessed June 2020.

<sup>6</sup> PWC, 'What's the real value of AI for your business and how can you capitalise?' (<https://www.pwc.com/gx/en/issues/analytics/assets/pwc-ai-analysis-sizing-the-prize-report.pdf>); PWC, 'Will robots steal our jobs? The potential impact of automation on the UK and other major economies? Available at (<https://www.pwc.co.uk/economic-services/ukey/pwcukeo-section-4-automation-march-2017-v2.pdf>)

<sup>7</sup> House of Lords Select Committee on Artificial Intelligence, 'AI in the UK: ready, willing and able?' 19, HL Paper 100.

<sup>8</sup> Department for Business, Energy & Industrial Strategy and the Department for Digital, Culture, Media & Sport, 'Policy paper AI Sector Deal', (21 May 2019). Available at <<https://www.gov.uk/government/publications/artificial-intelligence-sector-deal/ai-sector-deal>> last accessed 20 July 2020.

<sup>9</sup> McKinsey Global Institute, 'A future that works: Automation, employment and productivity' (2018); McKinsey Global Institute, 'Artificial Intelligence the Next Digital Frontier?' (June 2017).

<sup>10</sup> MaryAnne, M Gobble 'Big Data: The Next Big Thing in Innovation' (2013) Research-Technology Management, 56:1, 64-67, DOI: 10.5437/08956308X5601005.

is a recognised and ‘vexing’ problem.<sup>11</sup> The strive to democratise access to AI benefits brings profound implications for the legal and regulatory regimes that underpin modern society.<sup>12</sup> Transparency is an imperative policy objective in the context public trust in algorithmic determination. Without ethical policy considerations, ‘mutant algorithms’<sup>13</sup> will automate the perpetuation of existing bias and societal hierarchy. Although, in the UK and further afield, AI development has been largely without government intervention, focusing instead on data protection and privacy laws to ensure that private data is not abused.<sup>14</sup> Conclusively, intellectual property rights (IPRs) are intricately woven into the fabric of technological advancement and therefore offer the most appropriate existing legal rubric to protect and harness these emerging technologies.

## **1.2. Aim and Purpose**

Accordingly, the aim of this study is to examine the approaches of different jurisdictions to the recognition and protection of AI, contributing to the legal and ethical questions that arise in our shared socio-technical environment. The study therefore focuses on the intersection of IPR and the cognitive problem-solving applications of AI, where copyright and patent

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<sup>11</sup> Elizabeth Denham, Select Committee on Artificial Intelligence, Corrected oral evidence: Artificial Intelligence, Tuesday 31 October 2017, 3.30 pm.

<sup>12</sup> Francis Gurry, director general of WIPO, address to a seminar on IP Rights as Key Success Factors for AI Driven Businesses (Helsinki, February 5, 2019).

<sup>13</sup> Sean Coughlan, ‘A-levels and GCSEs: Boris Johnson blames ‘mutant algorithm’ for exam fiasco’ 26<sup>th</sup> August 2020 <<https://www.bbc.co.uk/news/education-53923279>> accessed 6<sup>th</sup> September 2020.

<sup>14</sup> Babuta, A., Oswald, M. and Rinik, C. (2018) ‘Machine Learning Algorithms and Police DecisionMaking: Legal, Ethical and Regulatory Challenges’, RUSI Whitehall Reports, 3-18. London: Royal United Services Institute; Goddard, M. (2017) ‘The EU General Data Protection Regulation (GDPR): European Regulation that has a Global Impact’, *International Journal of Market Research*, 59(6), pp. 703–705. doi: [10.2501/IJMR-2017-050](https://doi.org/10.2501/IJMR-2017-050).

provisions relate, to assess the ability of IP to integrate seamlessly with advanced technology. This enables exploration of the arguments for and against extending human accolades to non-human entities in considering legal and ethical implications. In further examining the differing legislative strategies of foreign jurisdictions, an analysis of the effects of the lack of global uniformity on protection of AI generated works will be discussed, alongside how a demonstrable lack of legal certainty might impede innovation, hinder international relations and global homogenisation. This study seeks to answer two questions; to determine whether these respective legal regimes are truly ready, willing, and able to accommodate advanced intelligent machines; and discussing whether the current rubric and traditional scope of protection suitably protects stakeholders in AI development and achieves an acceptable balance of incentivising innovation and the lateral transfer of information and technology. Secondly, with an exploration of effective and legitimate institutional mechanisms, it will be discussed whether these can protect and encourage AI development with ethical ideals.<sup>15</sup>

### **1.3. Methodology**

The proposed research is based on secondary material or data already in the public domain (case law, journal articles, published surveys etc). It does not involve people in data collection through empirical research (eg. interviews or questionnaires). The ethical risk is low.

This study will be conducted using socio-legal research; drawing upon concepts from law, mathematics, computer science, academia, and economics. Building on grounding in local law, this thesis will then compare and contrast the differing approach of foreign jurisdictions,

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<sup>15</sup> D Lloyd, *The Idea of Law* (1st edn, Penguin 1976).

namely: the European Union (EU), the People's Republic of China (PRC), and the United States of America (US), further comparing the national approaches against their published AI strategy. It concludes by presenting a new pathway to secure legal certainty, harness the capabilities of AI, and shift public perception, through analysis of the suitability of existing intellectual property regimes and their propensity to be repurposed in order to achieve a standardised deployment with ethical ideals.

#### **1.4. Limitations**

The limitations of this study are determined by the censorship of information and news within the Peoples Republic of China. Furthermore, AI is an emerging technology; the lack of widespread deployment ensuring limited judicial and legislative precedent on the convergence of AI and IP.



## **2. Introducing Concepts**

### **2.1. Justifying Intellectual Property Rights**

Intellectual property rights create and maintain a diversified and meritocratic economic market; bringing broader, positive effects to competition.<sup>16</sup> Monopoly rights simultaneously give the right to assert ownership and prevent others from using the works and the right to negotiate payment in return for using them.<sup>17</sup> Preventing the creator being undercut by competitors who do not have the initial sunk costs of bringing the product to market, avoiding any risk of over-exploitation.<sup>18</sup> There are two broad justifications for IPRs. The first is that of ‘natural rights’; out of fairness, inventors and creators should be recognised and rewarded and this notion is constitutionalised in the Universal Declaration of Human Rights.<sup>19</sup> The second, utilitarian argument encompasses that benefits from creations will advance and further enrich society and inventors should be remunerated for their investment of time and money to incentivise production.

In view of the above, a strong case can be made in support of IPRs as a vital tool for economic development. Though, IPR’s should be considered in the context of society as a

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<sup>16</sup> Ibid at 4; Denicol, V. 1996. "Patent Races and Optimal Patent Breadth and Length." *Journal of Industrial Economics* 44:249-265.

<sup>17</sup> Cornish, Llewelyn and Aplin, *Intellectual Property: Patents, Copyright, Trade Marks and Allied Rights* (Sweet & Maxwell, 9<sup>th</sup> Ed, 2018) p6, 1-004.

<sup>18</sup> E Hettinger, ‘Justifying Intellectual Property Rights’ (1989) 18 *Philosophy & Public Affairs* 31,2.

<sup>19</sup> Art 27(2) Universal Declaration of Human Rights

whole.<sup>20</sup> While both commercial and ethical views are founded on utilitarian arguments - therein, promotion of the general public good - there are contrasting interpretations.<sup>21</sup> On the one hand IPRs strongly emphasise individualism, through acknowledgment of the creation as an extension of the individual and rewarding the creator with a personal guarantee.<sup>22</sup> This view focuses on the individual, however, arguably reducing intellectual rights to the interests of the owner. On the other hand, novel creations of societal benefit should be viewed in the background of the wider community; shifting the focus to the recognition of the essential value of the creation to society as a whole; a cog in the economic machine linked to the creator in recognition of their contribution to society.<sup>23</sup> The monopoly powers are awarded on the premise that the information is transferred and disseminated to the public at large, after a suitable period of personal exploitation for the owner. The World Trade Organisation (WTO) reinforces that ‘the protection and enforcement of IPRs should be used to effect the promotion of innovation, transfer and dissemination of technology in a manner that is conducive to social and economic welfare’.<sup>24</sup> To achieve these ends, there is a globally recognised and effective system of registration for intellectual property rights - though not all - alongside a canopy of international

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<sup>20</sup> This is a general view of IPR, helping give a holistic perspective of their position in the global economy. A more in-depth discussion of specific rights will follow in subsequent chapters.

<sup>21</sup> See N.1 at p5,2.

<sup>22</sup> Cornish, LLewelyn and Aplin, *Intellectual Property: Patents, Copyright, Trade Marks and Allied Rights* (Sweet & Maxwell, 9<sup>th</sup> Ed, 2018) p6, 1-004.

<sup>23</sup> T. Palmer, ‘Are Patents and Copyrights Morally Justified?’ (1990) 13 Harvard Journal of Law and Public Policy; See N.1.

<sup>24</sup> Directors General of WIPO, WHO and WTO address the Joint Technical Symposium on Sustainable Development Goals. Available at <[https://www.wipo.int/policy/en/global\\_health/](https://www.wipo.int/policy/en/global_health/)> accessed July 2020.

agreements,<sup>25</sup> striving for and governing a uniform global approach towards the protection of these rights.<sup>26</sup>

## **2.2 What is Artificial Intelligence?**

AI is a human endeavour, a division of computer science concerned with the automation of intelligent behaviour.<sup>27</sup>,<sup>28</sup> There are various pathways and strategies to achieving technological super-intelligence, or so called generalised artificial intelligence;<sup>29</sup> a system that can act and think with consciousness and is able to deal intelligently with new problems.<sup>30</sup> The House of Lords Select Committee defined AI as technology with the ability to perform tasks that would otherwise require human intelligence, such as visual perception, speech recognition, and language translation, along with the ability to learn and adapt to new stimuli.<sup>31,32</sup> It is this

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<sup>25</sup> WTO, 'About the World Trade Organisation' available at <[https://www.wto.org/english/thewto\\_e/thewto\\_e.htm](https://www.wto.org/english/thewto_e/thewto_e.htm)> accessed July 2020.

<sup>26</sup> Bamford, Embley and Hancock, *Commercial and Intellectual Property Law and Practice* (CLP 2020) p216, 17.1.

<sup>27</sup> House of Lords Select Committee on Artificial Intelligence, 'AI in the UK: ready, willing and able?'

<sup>28</sup> –19, HL Paper 100.

<sup>29</sup> A more detailed and abstract discussion of these is articulated brilliantly by Nick Bostrom *Superintelligence. Paths, dangers, strategies* (OUP 2014).

<sup>30</sup> Ben Coppin *Artificial Intelligence Illuminated* (Jones & Bartlett 2004), p4, 1.2

<sup>31</sup> House of Lords Select Committee on Artificial Intelligence, 'AI in the UK: ready, willing and able?' 19, HL Paper 100.

ability to respond to its environment that gives AI the ability to provide excellent solutions to situations where traditional data extraction methods are too slow; surpassing ordinary computational algorithms ability to analyse diverse datasets and optimise performance against complex goals.<sup>33</sup>

### **2.2.1. Machine Learning**

Machine learning (ML) simply involves programming algorithms with the ability to learn.<sup>34</sup> Modern advances in ML have emerged from introspective research into human grey matter.<sup>35</sup> The technological architecture behind ML replicates neural networks within the human brain, made up from layers of processing nodes - simple devices with two states: on or off - which connect together to form a network.<sup>36</sup> By combining millions of these nodes together into a complex network, the resulting computational algorithm is able to analyse, assimilate and evaluate the existence and significance of individual features in the input data. Possessing the ability to detect anomalies and patterns in new and unstructured data.<sup>37</sup> Enabling exceptional diagnostic, prognostic or visualisation tools which enable the human counterpart

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<sup>33</sup> Babuta, A., Oswald, M. and Rinik, C 'Machine Learning Algorithms and Police Decision Making: Legal, Ethical and Regulatory Challenges' (2018) RUSI Whitehall Reports, 3-18. London: Royal United Services Institute.

<sup>34</sup> P Domingos, *The master algorithm: How the quest for the ultimate learning machine will remake our world* (Basic Books 2015).

<sup>35</sup> Alpaydin Ethem, *Machine Learning* (MIT 2006) p104.

<sup>36</sup> Ibid, p 104.

<sup>37</sup> Studies in Computational Intelligence Volume 488 (2013 Springer); J Kacprzyk: Abdelmalek Amine, Otmane Ait Mohamed, Ladjel Bellatreche, 'Modelling Approaches and Algorithms for Advances Computer Applications' (Cambridge 2016), 76:1.

to perform highly complex tasks effortlessly.<sup>38</sup> Utilising a pre-classified training data set by the programmer, these ground truths act as parameters to its output; with further manual interference these systems can be modified to achieve more accurate classifications or alter the overall objective by adjusting the weight and significance of connections. They are widely considered ‘intelligent’, but most ML systems are more analogous to decision tree models from the field of mathematics; using statistical methods to generalise from the data.<sup>39</sup>

### **2.2.2. Deep Neural Networks**

Deep learning (DL) - an advanced method of ML - involves utilising multiple layers of neural networks to learn a variety of skills and gain enough rules of reason, to then apply these rules to situations outside of training parameters.<sup>40</sup> The overarching purpose and goal are defined by the human designers, but the machine agent is free to determine its own subgoals in order to achieve that purpose independently.<sup>41</sup> The continuous flow of nodes react to the input and preceding layers; developing increasingly complex cognitive functions.<sup>42</sup> Leading to

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<sup>38</sup> Luger, G, *Artificial Intelligence: structures and strategies for complex problem solving* (Pearson Education, Inc 2009) p1.

<sup>39</sup> Chi.-Kent J. ‘AI Patents: A Data Driven Approach’ (2019-2020) Intellectual Property 407.

<sup>40</sup> Computational Robotics Lab at ETH Zurich demonstrated how an AI system was capable of teaching itself to ice skate. Available at <<http://crl.ethz.ch/>> accessed July 2020.

<sup>41</sup> See N.32 at 105.

<sup>42</sup> See N. 36 at 106.

unconventional ‘thinking’ and original solutions to traditional problems.<sup>43</sup> Google’s AlphaGo DL program beat its human opponent five to three at the complex board game ‘GO’; displaying ‘human-like creativity’ when it made a new and unexpected move that went beyond the data on which it was trained.<sup>43</sup> This level of creativity and comprehension has been applied to language understanding - natural language processing programmes, for example GPT-3, has impressed AI with the ability to understand the meaning of and interact with humans in ordinary language; resulting in claims it is able conceptualise and communicate new ideas.<sup>44</sup>

### **2.2.3. Intelligence and Autonomy**

Deep neural networks display the ability to learn and adapt to changing environments with a degree of autonomy.<sup>45</sup> Learning and intelligence are intimately linked but there is no single scale on which intelligence can be compared.<sup>46</sup> The traditional method of comparing human-machine intelligence was developed by British mathematician Alan Turing,<sup>47</sup> the objective of the machine was to display human-level intelligence indistinguishable from human

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<sup>43</sup> N Heeless, J Merell, and Z Wang, ‘Producing flexible behaviours in simulated environments’ (2017)

<https://deepmind.com/blog/article/producing-flexible-behaviours-simulated-environments>. Accessed July 2020

<sup>43</sup> At first instance the developers instinctively thought the machine had made a mistake.

<sup>44</sup> Accolades that it can write sequels to “Lord of the Rings” and even prescribe appropriate medicines.

<sup>45</sup> Legg, S., Hutter, M. ‘Universal Intelligence: A Definition of Machine Intelligence’ *Minds & Machines* 17, 391–444 (2007).

<sup>46</sup> Bringsjord, S., & Schimanski, B, ‘What is artificial intelligence? Psychometric AI as an answer’ (2003) Eighteenth International Joint Conference on Artificial Intelligence, 18, 887–893

<sup>47</sup> Luger, G, *Artificial Intelligence: structures and strategies for complex problem solving* (Pearson Education, Inc 2009) p3.

behaviour when asked questions through digital text. More refined versions have been developed today which resist obvious tricks to confuse the interrogator which could be encoded.<sup>48</sup> Although it has been stated that these still focus on a very narrow aspect of intelligence, with critics arguing as to whether machine intelligence should be marked against its ability to impersonate human behaviour.<sup>49</sup> Alternatively, when considering the intelligence of other minds, there are thought provoking theories that consciousness – referring to subject experience and, by way of corollary, intelligence – is inexplicably linked to feedback.<sup>50</sup> The ability to receive and process data and interact with our surroundings enables human comprehension and problem-solving abilities; arguably the foundation of intelligence within our understanding.<sup>51</sup>

Autonomy, is equally ambiguous, in terms of legislative policy, refers to the ability of computational agents to independently perform tasks that require decision making about its

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<sup>48</sup> Shane Legg, Marcus Hutter ‘A Formal Measure of Machine Intelligence’ Annual Machine Learning Conference of Belgium and The Netherlands (Benelearn 2006 15<sup>th</sup> edn) 73-8, 74.

<sup>49</sup> Ibid.

<sup>50</sup> P. Godfrey-Smith, *Other Minds: The Octopus and the Evolution of Intelligent Life* (William Collins 2017); see also, M. Davies, & G. W Humphreys, ‘Readings in mind and language, Vol. 2. Consciousness: Psychological and philosophical essays’ (Blackwell Publishing 1993 Eds.)

<sup>51</sup> R. E Nisbett, J. Aronson, C. Blair, W. Dickens, J. Flynn, D. F Halpern, & E. Turkheimer, ‘Intelligence: New findings and theoretical developments’ (2012) *American Psychologist*, 67(2), 130–159; Rosenthal, D. M., ‘Thinking that one thinks. Bielefeld’ (1989) Germany: Zentrum für Interdisziplinäre Forschung.

own performance, without direct input from human operators and without human control.<sup>52</sup> Therein, agents learn an optimal strategy for a specific situation and gain the ability to recognise the situation, recall the appropriate strategy, and apply this logic to similar situations without manual interference.<sup>53</sup> Applying this definition to AI arguably displays the capacity for intentional AI behaviour by exhibiting autonomous learning and intuition.

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<sup>52</sup> European Group on Ethics in Science and New Technologies ‘International Association for the Protection of Intellectual Property Resolution and Summary’ (EGE 2018) Available at [https://aippi.org/wp-content/uploads/2019/08/SummaryReport\\_COPYRIGHT-DATA\\_London2019\\_final\\_160719.pdf](https://aippi.org/wp-content/uploads/2019/08/SummaryReport_COPYRIGHT-DATA_London2019_final_160719.pdf) accessed July 2020.

<sup>53</sup> See N.32 at p18.



## **Chapter 3: Protecting Creations: Copyright**

### **3.1. Introduction**

AI is increasingly used to generate creative content with expression mistakenly similar to that of a natural person without manual interference and decision making.<sup>54</sup> Automating the creative process will bring fundamental changes to the copyright content market. Benevolent changes such as enabling a generation of works by persons with disabilities which that would otherwise be absent;<sup>55</sup> but also flooding the market with lowcost mass re-productions which resemble human authorial works. Bringing modern challenges to the conventional legal regime. In an attempt to align with the digital age, the UK copyright system has accommodated fundamental changes to ensure that developers gain protection over their intellectual endeavour of coding the architecture underpinning the neural network and the extension of copyright to computer generated works.<sup>56</sup> Although, in light of the resolution adopted at the International Association for the Protection of Intellectual Property in 2019,<sup>57</sup> copyright should only be conferred if there is recognised human contribution. However, AI's ability to generate work independently without significant contribution to the creative works makes it seems wrong to attribute authorship, along with the 'tyrannical' exclusivity rights adjoined, to the neighbouring

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<sup>54</sup> Julia Dickenson, Alex Morgan, Birgit Clark, 'Creative machines: ownership of copyright in content created by artificial intelligence applications' (2017) E.I.P.R., 39(8), 457-460, 458.

<sup>55</sup> Blake E. Reid, Caroline B. Ncube 'Revised Scoping Study On Access To Copyright Protected Works By Persons With Disabilities' Standing Committee on Copyright and Related Rights, SCCR/38/3 (MARCH 13, 2019); Joe Chidzik, 5 Ways AI Could Transform Digital Accessibility, <https://www.abilitynet.org.uk/newsblogs/5-ways-ai-could-transform-digital-accessibility>> accessed July 2020.

<sup>56</sup> Ibid.

<sup>57</sup> See N.32.

human.<sup>58</sup> To award authorship where it is against the economic reality undermines the human centric view of intellectual endeavour, creativity, and self-expression. However, any attempts segueing from the human centric view is fiercely opposed.<sup>59</sup> As the law grapples with new types of machine-driven creativity, it must be considered whether Copyright Design and Patents Act 1988 (CDPA) is the most suitable regime as it is outdated and lies awkwardly with modern technology; and decisively, any ambiguity surrounding authorship and corresponding ownership brings jarring commercial implications and raises broader innovation policy considerations.

### **3.2. Authorship: ‘The Writer or the Pen?’**

In order to consider how the extent of copyright protection is afforded to AI generated inventions, an in-depth analysis of authorship is needed. This is framed as a consideration of whether copyright should be conferred on the writer or the pen. Section 9(3) Copyright Designs and Patent Act 1988 (CDPA) holds that the author is the person who creates it. Conception is therefore the touchstone of authorship; customarily requiring contribution of skill and labour of an artistic kind.<sup>60</sup> The creation of works involving AI activity comprises of two distinct stages; the software development stage and its utilisation. Despite the argued

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<sup>58</sup> See N.52.

<sup>59</sup> Julia Dickenson, Alex Morgan, Birgit Clark, ‘Creative machines: ownership of copyright in content created by artificial intelligence applications’ E.I.P.R. 2017, 39(8), 457-460, 459; see also Lehmann and Tapper *Handbook of European Software Law* (1993 eds OUP) p150.

<sup>60</sup> *Nova Productions v Mazooma Games* [2007] EWCA Civ 219

autonomy of these machines, they are still developed and operated by humans.<sup>61</sup> A literal interpretation of s.9(3) confers copyright protection to the programmer or operator in the event of computer-generated works. From a legal standpoint, AI is perceived as a tool. Accordingly, copyright law has enveloped the requirement of a natural person contributing to the creation of the works in order for copyright to subsist. This is logical, considering it is the human programmer which sets parameters and objectives. Alternatively, it is the operator who made the necessary arrangements for the output. This catch all provision of ‘computer-generated works’ has found traction, creating legal certainty with concise and broadly interpretable wording. However, this would seem to suggest that there is no requirement of creativity and originality of the author’s contribution.<sup>62</sup> There are already instances where creative works are automatically visualised by AI software and these instances will increase.<sup>63</sup> Consequently, this resulting legal fiction of entitlement through use is arguably an unsatisfactory claim to copyright protection. There is no significant manual interference, nor do the operators convey an expression of an idea or feeling; there is a demonstrable lack of artistic skill and labour.<sup>64</sup> Consequently the user cannot claim absolute conception of the works.<sup>65</sup> Reducing validity in

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<sup>61</sup> Dr Noam Shemtov, ‘A study on inventorship in inventions involving AI activity’ (2019) Intellectual Property and Technology Law, Centre for Commercial Law Studies, Queen Mary University of London (Commissioned by the European Patent Office)

<sup>62</sup> A Guadamuz, ‘Do Androids Dream of Electric Copyright? Comparative Analysis of Originality in Artificial Intelligence Generated Works’ (2017) Intellectual Property Quarterly, 2017 (2), 3.1. Available at SSRN: <https://ssrn.com/abstract=2981304> accessed July 2020.

<sup>63</sup> P Domingos, *The master algorithm: How the quest for the ultimate learning machine will remake our world* (Basic Books 2015).

<sup>64</sup> See N. 58, at 49.

<sup>65</sup> Julia Dickenson, Alex Morgan, Birgit Clark, ‘Creative machines: ownership of copyright in content created by artificial intelligence applications’ European Intellectual Property Review E.I.P.R. 2017, 39(8), 457-460.

attributed copyright on account of unchartered legislative provisions governing the creative output of AI systems. Additionally, there exists a causal link between the lack of legislative clarity and increasing instances of litigation, whereby courts are forced to analyse artistic contribution to the work on a case by case basis.<sup>66</sup>

There is much support to say the extension of copyright to cover AI generated works is antipathic to nature of the copyright system; offending copyright nature of author's rights. In turn, blurring the line between work created by human and machine.<sup>67</sup> Contrariwise, failure to acknowledge AI involvement risks undermining the human centric view. The primordial function of copyright law is to acknowledge and reward the true and original author of works. Any deviation from this is against the notion of identifying the true author of the work and therefore generally seen to be incompatible with European Union law and wider international copyright law.<sup>68</sup> The precise nature and scope of the commercial implications this legal uncertainty will cause is unclear, although it is foreseeable that there will be a chilling effect on investment in AI. There will be no incentive to develop the software as developers doubt whether these works will qualify for copyright protection.<sup>69</sup>

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<sup>66</sup> *Nova Productions Ltd v Mazooma Games Ltd* [2006] EWHC 24 (Ch); [2006] E.M.L.R. 14.

<sup>67</sup> J C. Ginsburg, 'People Not Machines: Authorship and What It Means in the Berne Convention' (2018) IIC 49, 131–135, 133; See N.60 at 457.

<sup>68</sup> See N.62.

<sup>69</sup> T Palmer, 'Are Patents and Copyrights Morally Justified?' (1990) 13 Harvard Journal of Law and Public Policy.

Conclusively, in view of the difficulties above, granting copyright to the person who made the necessary arrangements for AI generated works to arise seems to be the most sensible approach. The UK's approach has set a leading example of how to address the emerging challenges; muting most, if not all, arguments of AI authorship. Assessing the contribution on a case by case basis creates legislative flexibility, allowing for adaptable application of the law in a just manner. Which is essential, given the fast-moving pace of technological development. However, the retrospective nature of the common law will not address the economic challenges of market failure.

### **3.3. Challenges to the Traditional Copyright Assessment**

Aligning the copyright regime with modern technology is a difficult task. Traditional assessment includes the doctrine of skill and labour, and a threshold of originality which requires creative choices.<sup>70</sup> Admittedly, the thresholds of these are relatively low but they are globally recognised, and AI's profile does not sit comfortably within.<sup>71</sup>

Firstly, the method by which AI creates output arguably thwarts any attempts to pass the bar for originality and brings additional nuanced complexities.<sup>72</sup> The seamless integration

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<sup>70</sup> *Temple Island Collections Ltd v New English Teas Ltd and Another (No. 2)* [2012] EWPCC 1.

<sup>71</sup> A Ramalho, 'Will Robots Rule the (Artistic) World? A Proposed Model for the Legal Status of Creations by Artificial Intelligence Systems (June 13, 2017). Available at SSRN: <https://ssrn.com/abstract=2987757> or <http://dx.doi.org/10.2139/ssrn.2987757>.

<sup>72</sup> A Guadamuz, 'Do Androids Dream of Electric Copyright? Comparative Analysis of Originality in Artificial Intelligence Generated Works (June 5, 2017). Intellectual Property Quarterly, 2017 (2), Available at SSRN: <https://ssrn.com/abstract=2981304>.

of national and European Union law<sup>73</sup> holds that originality necessarily involves the authors own ‘intellectual creative effort’.<sup>74</sup> Accordingly, for AI works to surpass the threshold of originality, the assessment turns to the data processed and creativity in its processing.<sup>75</sup> AI could be argued to organise the material in an original way, bringing together different elements. For instance, in the Rembrandt-project, an entirely ‘new’ painting was created using AI; using the collection of Rembrandt paintings as training data.<sup>76</sup> Though the originality of this process and output questionable. Data underpins the learning and creation

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<sup>73</sup> A Rahmatian, ‘Temple Island Collections v New English Teas: an incorrect decision based on the right law?’ (2012) 34 European Intellectual Property Review 796.

<sup>74</sup> *Infopaq International v. Danske Dagblades Forening* [2009] ECDR 16 (Case C-5/08), 27-34.

<sup>75</sup> M Leistner, ‘Big Data and the EU Database Directive 96/9/EC: Current Law and Potential for Reform’, in *Trading Data in the Digital Economy: Legal Concepts and Tools*, (Lohsse, S., et al, eds), NOMOS, 2017, pp.25-58.

<sup>76</sup> Microsoft, ‘The Rembrandt Project: How a Microsoft machine learning AI created this entirely new Rembrandt’ (2016) Available at <<https://www.thedrum.com/news/2016/04/07/how-microsoft-machine-learningai-created-entirely-new-rembrandt>> accessed July 2020.

process, which necessarily includes component pieces of the generated output; arguably lacking any substantial demonstration of skill and labour. Moreover, this isn't a strong legal basis for copyright protection;<sup>77</sup> attention should also be drawn to possible infringing acts. The alleged copyist, the AI, patently has access to the original works and do the two pieces do look and feel substantially similar. Illustrating the complex copyright issues underlying the use of training data.<sup>78</sup>

Additionally, there is fundamental problem in labelling a machine creative; a predominant tenement of the copyright system. We judge artists by both their technical innovations and their creative insights.<sup>79</sup> Although, art and creativity are subjective and contextual; creativity arguably lies in the ambiguity of interpretation and misinterpretation of language between the reader and the author. Contrariwise, AI systems are very robust, both physically in their ability to avoid and account for errors.<sup>80</sup> Their binary nature only allowed interpretation the input data under the parameters and constraints under which it is programmed.<sup>81</sup> There is, therefore, some difficulty diverting from a human centric view of creativity.

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<sup>77</sup> G Spindler, lecture, as Professor of Civil, Commercial, Business, Multimedia and Telecommunications Law, Göttingen (2017).

<sup>78</sup> M Chen, 'Beijing Internet Court denies copyright to works created solely by artificial intelligence' (2019) *Journal of Intellectual Property Law & Practice*, Vol. 14, No 8, 3.

<sup>79</sup> J Campbell, *The inner reaches of outer space* (1986 New York: HarperCollins).

<sup>80</sup> See N.72.

<sup>81</sup> Rachel Gordon 'Algorithm finds hidden connections between paintings at the Met' (2020) MIT Computer Science.

### **3.4. Is the Copyright Regime Proportionate and Morally Justified?**

There is industry concern that the monopoly powers afforded by the copyright regime are disproportionate.<sup>82</sup> The works are recognised and protected by an accolade at the relevant time, yet the exclusivity rights span far beyond the natural life of the author and as such far beyond the society in which it was granted. This is particularly concerning given the fastpaced technological advancement and rapid diminishing value of information. Taking the data mining example, samples of software or training databases could lead to the next great humanitarian progress.<sup>83</sup> There is a growing impetus for opensource databases and increasing collaboration. However, in the context of data access on the World Wide Web, there is an obvious lack of public acceptance that breaking IP laws is wrong.<sup>84</sup> Consequently, cyberspace has developed norms of free exchange of information which could be sufficiently strong to override the norm that laws, specifically IP laws, should be obeyed.<sup>85</sup> Accordingly, to address the issue, shorter copyright protection or compulsory licences for AI development is advocated based on egalitarian premises, enabling greater access to data and encouraging domestic AI development and growth.<sup>86</sup>

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<sup>82</sup> Christopher Jensen, 'The More Things Change, the More They Stay the Same: Copyright, Digital Technology, and Social Norms' (2003) 56 Stan L Rev 531; see also E. Hettinger, 'Justifying Intellectual Property Rights' (1989) 18 Philosophy & Public Affairs 31.

<sup>83</sup> E Bayamlioğlu and R Leenes, 'The "rule of law" implications of data-driven decision making: a technoregulatory perspective' (2018) Law, Innovation and Technology, 10(2), pp. 295-313.

<sup>84</sup> Tom R Tyler, 'Compliance with Intellectual Property Laws: a Psychological Perspective' (1997) 29 NYU KJ Int'l & Pol 219, 226.

<sup>85</sup> Joel Reidenberg, 'Lex Informatica: The Formation of Information Policy Rules through Technology' (1998) 76 Tex L Rev 568. See N.78 at 540;

<sup>86</sup> See N. 77.



### **3.5. Conclusion to the Chapter**

Conclusively, the current legislation is not suited to emerging technology. The developed legal framework applies solely where machines are used to enhance creativity, not in circumstances of rivalling or even replacing human ability to create. Copyright's primordial function is to offer an enabling environment for human creativity to flourish.<sup>87</sup> Therefore, the notion of entitlement through use, and the award of broad exclusivity rights, should be approached with caution, to avoid actively facilitating the flooding of the copyright market and diluting the attributed accolades. While the governmental strategy is positioned to encourage AI development and incentivise its beneficial contribution to societal development, data, as the underlying driving force behind AI, is subject to the antiquated system and does not accommodate or appreciate its value within AI development. Actively hindering the ability of AI to be 'let loose' on humanitarian problems utilising data freely for the benefit of society as a whole. Demonstrably, the copyright protection in its current form is disproportionate. While the cultural and economic benefits which the copyright markets facilitate are undoubted, the length of protection isolates and segregates vital information at the will of private actors. Accordingly, AI developers may be obliged to develop outside the jurisdiction and avoid the legal challenges these laws bring; which misaligns heavily with the governmental strategy of leadership in AI development and incentivising domestic innovation.<sup>88</sup>

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<sup>87</sup> Blake E. Reid, Caroline B. Ncube 'Revised Scoping Study on Access to Copyright Protected Works by Persons with Disabilities' Standing Committee on Copyright and Related Rights, SCCR/38/3 (MARCH 13, 2019).

<sup>88</sup> Tom R Tyler, 'Compliance with Intellectual Property Laws: a Psychological Perspective' (1997) 29 NYU KJ Int'l & Pol 219, 540.

## **4. Chapter 4: Protecting Inventions: Patents**

### **4.1. Introduction**

AI systems continues to improve our ability to think and imagine, developing new designs; side by side with humans but increasingly all by themselves. Patent applications involving AI activity have increased fourfold over recent years;<sup>89</sup> covering patentable subject matter such as pharmaceuticals and telecommunications.<sup>90</sup> There are dual conflicting pressures on AI developers; the need to patent and monetise for commercial return and the to provide open source platforms to encourage its use and innovation.<sup>91</sup> Consequently, there is a vital need for protection and ‘incentivisation’ of AI development and the patent system is arguably most suited with its technical nature almost analogous to AI. Yet, there is recognised tension between patent protection for an invention created solely by an AI system and the current legal position as expressed by various patent offices. Generally, under the Patent Act 1977 an invention is patentable if the concept is new, non-obvious, and useful,<sup>92</sup> which has centred around the human contribution of intellectual and practical endeavour. Despite this, there are increasing instances of substantial AI activity where the human developer behind the invention cannot claim absolute conception. The UK Intellectual Property Office has made a stance refusing to consider applications which name AI as inventors however, as they fail to identify ‘a natural

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<sup>89</sup> WIPO, ‘Technology Trends 2019: Artificial Intelligence’ (January 2019), at pg 22.  
<[https://www.wipo.int/edocs/pubdocs/en/wipo\\_pub\\_1055.pdf](https://www.wipo.int/edocs/pubdocs/en/wipo_pub_1055.pdf)> accessed June 2020

<sup>90</sup> Shlomid Yanisky-Ravid and Xiaoqiong Liu, ‘When Artificial Intelligence Systems Produce Inventions: The 3A Era and an Alternative Model for Patent Law’ (2018) 39 Cardozo L. Rev. 2215.

<sup>91</sup> Ben Hattenbach and Joshua Glucoft, ‘Patents in an Era of Infinite Monkeys and Artificial Intelligence’ (2015)19(2) Stan. Tech. L. Rev. 32.

<sup>92</sup> Section 1(1) the Patent Act 1977 (as amended).

person’.<sup>93</sup> This indicates that a human being must be the source of invention, therefore creating a legal presumption that AI inventions are not patentable. This is in spite of increasing academic and industry support for patent rights to be made available for inventions which represent new, non-obvious technical developments, regardless of how they are created.<sup>94</sup>

This chapter will begin with discussing whether the Intellectual Property Office’s (IPO) decision to bypass the traditional assessment of patentability and turn a blind eye to AI inventorship is justified. Then moving onto an analysis of some of challenges the augmented age of AI will bring to patent law; magnifying the ability and willingness of national legislation to recognise AI’s ability to realise novel inventions without significant manual intervention. This chapter ultimately argues that some recognition ought to lie with the inventive component. Evidently, the reluctance to acknowledge AI inventorship escalates legal uncertainty; failure to name the correct inventor can lead to a patent being held unenforceable, rearing commercial implications and broader innovation policy considerations.

#### **4.2. The IPO Decision**

Given the IP systems inherent aversion to change, the IPO’s decision electing to ignore AI inventorship is in line with expectations. The cornerstone of the decision is two patent applications made to various international patent offices, testing the legal position. The

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<sup>93</sup> EPO, ‘Guidelines for Examination 3.3.1 Artificial intelligence and machine learning’. Available at [https://www.epo.org/law-practice/legal-texts/html/guidelines2018/e/g\\_ii\\_3\\_3\\_1.htm](https://www.epo.org/law-practice/legal-texts/html/guidelines2018/e/g_ii_3_3_1.htm) last accessed July 2020.

<sup>94</sup> Coulter, M., ‘Patent agencies challenged to accept AI inventor’ (2019) Financial Times available at: <https://www.ft.com/content/9c114014-b373-11e9-bec9-fdcab53d6959>.> accessed July 2020.

applications relate to a receptacle based on fractal geometry and a novel distress device with enhanced attention attraction; both of which designated a connectionist AI system named DABUS as the inventor.<sup>95</sup> The human applicant argued in retort to the IPO's decision, to treat the applications as withdrawn, that the primordial function of the inventorship section is to determine the actual deviser of the invention; which must be both true and accurate for legal certainty.<sup>96</sup> There is a global consensus, however, that an inventor must be a natural person, not a company nor a machine.<sup>97</sup> The requirement of full name, address and signature in the application does support this stance. Consequently, the IPO remained inflexible in their stance, referring to a lack of judicial precedent which constrains the interpretation of the Patent Act to mean a natural person.<sup>98</sup> Nevertheless, the IPO decision arguably avoided addressing the more difficult deliberations on their own. Though, there may be subtle policy objectives behind this seemingly short-sighted stance; delaying the inevitable explosion of machine intelligence gives policy makers more time to consider the problem of how to control the explosion of machine intelligence. Giving society, humanity, and civilisation further time to reach maturity. Though,

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<sup>95</sup> EP 18275163 (fractal food container) and EP 18275174 (fractal light signals)

<sup>96</sup> The Patents Rules 2007, Decision: BL O/741/19 04 (2019) 21, Applicant Stephen L Thaler <https://www.ipo.gov.uk/p-challenge-decision-results/o74119.pdf> accessed July 2020.

<sup>97</sup> Daria Kim, 'AI-Generated Inventions: Time to Get the Record Straight?' (2020) GRUR International, 69:5, May, 443–456, 447.

<sup>98</sup> See N.96.

answers to these modern challenges are not going to be found in history; accordingly, the IPO are conducting a call for views to help understand how AI impacts on the IP framework.<sup>99</sup>

Furthermore, the decision set precedent overlooking any inquiry into an invention's inventiveness and novelty; which would arguably be a more justifiable rhetoric behind rejecting applications involving AI activity.<sup>100</sup> The inventive concept of the first invention was to connect containers and their robotic manipulators by external fractal profiles; argued to aid robotic handling. Though this faced criticism from the industry as failing the test for non-obviousness, the need to match their respective silhouettes is quite apparent.<sup>101</sup> The second application verged on the edge of sufficiency; the application lacked the necessary information to allow the device to be worked.<sup>102</sup> It relied on a sequence of flashing lights, as devised by the Applicant himself, which claimed helps attract human attention. Furthermore, the invention itself would arguably fail the test for inventiveness. The Inventor merely 'invented' a use for the theory and it seems obvious step to enhance the attention attraction ability of any alert system.

#### **4.3. Inventorship: Can AI Rival Human Ability to Invent?**

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<sup>99</sup> IPO, Open consultation: Artificial intelligence and intellectual property: call for views <https://www.gov.uk/government/consultations/artificial-intelligence-and-intellectual-property-call-for-views>> accessed July 2020.

<sup>100</sup> Andreas Engel, 'Can a Patent Be Granted for an AI-Generated Invention? (2020) *GRUR International*, ikaa117, doi: <https://doi.org/10.1093/grurint/ikaa117>

<sup>101</sup> Hidemichi Fujii and Shunsuke Managi, 'Trends And Priority Shifts In Artificial Intelligence Technology Invention: A Global Patent Analysis' (2018) *Economic Analysis and Policy*, Volume 58: 60-69.

<sup>102</sup> See N.95 at 63.

AI-human collaboration is increasing and more interesting patent applications can be expected. AI's subtle level of intuition and volition presents complex modern challenges to the traditional assessment.<sup>103</sup> The primary issue to be resolved is can AI truly be considered autonomously inventive; not just automated inventiveness.<sup>104</sup> Section 7(3) of the UK Patent Act 1977 defines an inventor as the actual deviser of the invention.<sup>105</sup> Inventorship can therefore be understood to require actual conception or material contribution to 'the heart of the invention' - the touchstone of inventorship.<sup>106</sup>

Artificial Intelligence's amicable reception to the patent regime therefore rests of the concept of inventor. Currently, humans are not removed or obsolete in the invention process. They specify the instructions which determine the computational analysis; settings objectives, parameters, and the input-output relations.<sup>107</sup> As such, commentators argue there is nothing intelligent in their contribution, and should not be discriminated against under patent law when compared to other tool-assisted inventions.<sup>108</sup> Accordingly, there have been calls for an internationally recognised definition of inventorship as 'one responsible for the intelligent and

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<sup>103</sup> Ryan Abbott, 'I Think, Therefore I Invent: Creative Computers and the Future of Patent Law' (2016) 57 B.C.L. Rev 1079.

<sup>104</sup> Peter Blok, 'The Inventor's New Tool: Artificial Intelligence – How Does It Fit In The European Patent System?' 39(2) E.I.P.R. 69 (2017).

<sup>105</sup> Read in light of *Markem Corporation v Zipher Ltd* [2005] EWCA (Civ) 267, [2005] R.P.C. 31.

<sup>106</sup> Ibid, the test was affirmed by the Court of Appeal at para 100–101.

<sup>107</sup> See N.57.

<sup>108</sup> Shlomid Yanisky-Ravid and Xiaoqiong Liu, 'When Artificial Intelligence Systems Produce Inventions: The 3A Era and an Alternative Model for Patent Law' 39 Cardozo L. Rev. 2215 (2018), 2222.

creative conception of the invention’ which would deny AI inventorship rights today and in the future.<sup>109</sup> Though this is arguably against the economic reality in instances of more autonomous and creative AI software, where the autonomous nature and apparent lack of human contribution or conception of the idea is decisively prejudicial to an inventor’s claim of absolute conceptualisation.<sup>110</sup> Hence, the programmer cannot claim absolute conception. Contrariwise, the above mentioned autonomous visualisation of creation and solution to problems arguably demonstrates more substantive conception and material contribution to the invention and - by way of corollary – a stronger claim to inventorship.

Furthermore, while most jurisdictions do not recognise AI as a legal person,<sup>111</sup> policy makers are not averse to extending legal recognition to fictitious entities. Partially recognised legal personalities have flirted with existence for centuries. Including extensions to cover animals which independently cause harm in French jurisprudence and fictional economic entities which invigorate growth in capitalist economies.<sup>112</sup> These entities have their justifications presupposed on both political and economic ideology. For instance, limited liability companies are a separate and flexible modern type of business entity aimed at

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<sup>109</sup> See N.73.

<sup>110</sup> Daria Kim, ‘AI-Generated Inventions: Time to Get the Record Straight?’ (2020) GRUR International, 69:5, 443–456.

<sup>111</sup> From AI To Russia, Here's How Estonia's President Is Planning For The Future, WIRED (04-05-2018) <https://www.wired.com/story/from-ai-to-russia-heres-how-estonias-president-is-planning-for-the-future>; See also, Estonia Plans To Give Robots Legal Recognition, The Independent (10-10-2017), at <https://www.independent.co.uk/news/business/news/estonia-robots-artificial-intelligence-ai-legalrecognition-law-disputes-government-plan-a7992071.html>> accessed July 2020.

<sup>112</sup> LB Solum, ‘Legal personhood for artificial intelligences’ (1991) 70 N.C. L. Rev. 1231.

encouraging corporate progression by allocating risk and providing limited liability to its owners; a tool or extension of the owner designed to generate profit which are of especially great valuable in capitalistic economic zones.<sup>113</sup><sup>114</sup> These fictional economic entities and doctrines of recognition forms the basis of company law and are rigorously followed by both judiciary and policy makers across the globe since its conception in the 17<sup>th</sup> Century.<sup>115</sup> Consequently, policy makers recognise these fictional entities on the pretence that they facilitate economic activity. These vehicles are routinely utilised to exceed the maximum level of economic risk, however. Through the use of a registered system, governments impose greater superintendence of entities' actions, by governing accurate records to ensure there is legal avenues of redress for liability; creating a transparent system of accountability. Accordingly, recognising AI as an inventive being may not diverge too far from existing legal norms; and the above could, perhaps, offer a skeletal rubric upon which policy makers could accommodate AI activity.<sup>116</sup>

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<sup>113</sup> *Salomon v A Salomon and Co Ltd* [1897] AC22, and enshrined in law by Article 16 of the Companies Act

<sup>114</sup> . Similar provisions can be seen in foreign jurisdictions - Company Law of the People's Republic of China Order No.15 of the President of the People's Republic of China; Securities Act of 1933 and the Securities and Exchange Act of 1934.

<sup>115</sup> Shaun M. Klein, 'Piercing the Veil of the Limited Liability Company, from Sure Bet to Long Shot: Gallinger v. North Star Hospital Mutual Assurance, Ltd' (1996) *Journal of Corporate Law*. 22: 131.

<sup>116</sup> Discussed in depth in section 6.2.2



#### **4.3.1. Inventorship and Ownership**

Since AI inventions continue to have a reasonable degree of human input, ownership issues have not arisen in practice.<sup>117</sup> However, as recognised in the IPO decision, the team behind AI inventions may not necessarily be able to derive a right in law of ownership simply by ownership of the AI programme, adding another layer of complexity.<sup>118</sup> Ownership over inventions is a substantive right but there is no law which leads to the transfer of ownership from the inventor. As per Patent Act, ownership of an inventor does not necessarily derive a right to inventorship, nor ownership of the invention.<sup>119</sup> Acquiring a right to a patent by virtue of ownership of the inventor is not a covered category, nor provided for in patent law. Artificially intelligent machines do not have a legal personality, independent rights, and cannot in itself hold property; consequently, a need for industry actors to circumnavigate the gap in corresponding ownership rights emerges.<sup>120</sup> Arguments advocating ownership could be based on the employee rubric. As per the Patent Act ‘an invention made by an employee shall be taken to belong to his employer if it was made in the course of the normal duties of the employee, and it was reasonably expected that an invention might result from the activities’. There is weight to this argument and AI assisted inventions may satisfy this benchmark;

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<sup>117</sup> See N.47.

<sup>118</sup> See N.96.

<sup>119</sup> United States Patent and Trademark Office, Applications: Nippon Piston Ring Co. Ltd.'s, RPC Volume 104, Issue 6, 1987, Pages 120–132.

<sup>120</sup> IPO Decision BL O/741/19 04 December 2019, 21.

however, this would force the courts to consider AI in the context of the extensive rights afforded under the Employee Rights Act.

#### **4.4. Challenges to the Traditional Assessment of Patentability**

The tendency to anthropomorphise algorithms is argued to be an obstacle to properly conceptualising the technological state of AI and, by way of consequence, hinder proper consideration of the legal challenges posed.<sup>121</sup> Consequently, this section proceeds to subject the technological basics of AI processing to the assessment of patentability and consider the legal challenges which arise from both the common law.

Patent law holds that the inventive step this must not be an obvious step to those skilled in the art. The sub-test of ‘obvious-to-try’<sup>122</sup> is contentious in the context of AI as the machine will have had several technical options to pursue in order to arrive at the invention with a ‘fair expectation of success’.<sup>123</sup> As in the case of the DABUS, it appears obvious that a solution would arise given AI’s encoded instructions. AI systems are simply enhanced methods of brute force; it is arguable that no inventive step can result from an automatic consequence of a non-inventive activity. Contrariwise, when considering inventions which result from sheer luck, rather than a flash of genius, they are nevertheless still be patentable despite the apparent lack

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<sup>121</sup> David Watson, ‘The Rhetoric and Reality of Anthropomorphism in Artificial Intelligence’ 29 *Minds & Machines* 417-440, 434 (2019), 417.

<sup>122</sup> *Actavis Group PTC EHF & Ors v ICOS Corporation & Anor* [2019] UKSC 15.

<sup>123</sup> *Conor Medsystems Incorporated v Angiotech Pharmaceuticals Incorporated and others* [2008] UKHL 49.

of inventiveness.<sup>124</sup> Furthermore, DNN solve computational problems which resist efficient resolutions. that is to say, it is impossible to consider all potential resolutions due to computational constraints; the AI learns from its previous experience and improves its performance, competency, and accuracy at each stage. This is arguably a display of intuition, which should not frustrate the inventions patentability.

Secondly, determining the inventiveness is a subjective test; Section 3 Patents Act 1977 ‘an invention shall be considered as involving an inventive step if, having regard to the state of the art, it is not obvious to a person skilled in the art’. The courts therefore attribute to each member of team an appropriate degree of skill. Though, the skilled person should be interpreted very differently when considering AI involvement.<sup>125</sup> That is to ask if the doctrine of skilled persons be augmented to include machine intelligence. To exclude AI from this would place an artificially low threshold of obviousness; an easily surmountable maximum for teams with AI software augmenting their capabilities.<sup>126</sup> Contrariwise, conflating artificial intelligence with human ability will natural lead to a much higher level of inventiveness; presenting an insurmountable threshold and place ordinarily patentable inventions only in the reach of the most advance teams and nations. This, in the context of broader innovation policy objectives,

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<sup>124</sup> See N.73.

<sup>125</sup> Rebecca S Eisenberg, ‘Obvious to Whom? Evaluating Inventions from the Perspective of PHOSITA.’ (2004) Berkeley Tech. L. J. 19, no. 3: 885-906.

<sup>126</sup> Ryan Abbott, ‘Everything Is Obvious’ (2018) 66 U.C.L.A. Law Review 1, 29 n 154

has the potential to increase the innovation gap between leading nations and large private technology companies.<sup>127</sup>

Finally, an invention's novelty is a decided matter of fact and judgement: does something similar exist in the public domain? One major complaint by industry actors is how to be sure any new invention is truly state of the art, especially in on a fast-moving and revolutionary global stage. It is notoriously difficult to examine all of the prior art and distinguish similar elements in already complicated sectors.<sup>128</sup> AI research methods will inevitably lead to these 'discoveries' becoming more widespread, as alternative solutions to historical problems are discovered.<sup>129</sup> This may potentially flood the patent market with novel creations, requiring an incomprehensible amount of human resources, or computational power, to truly consider each inventions novelty.<sup>130</sup> This may therefore cast a shadow on the validity of patents. There are inherent problems in the relationship between novelty and the statutory exclusion of discoveries; the commercial value of discoveries is that this information is usable earlier than it otherwise would be.<sup>130</sup> Patents within the life sciences sector can arise from unexpected and surprising results from alternative treatment methods which may not be considered 'new' or fall foul of the discovery exclusion; such as variations in the dosage and

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<sup>127</sup> Ian M Cockburn, Rebecca Henderson and Scott Stern, 'The Impact of Artificial Intelligence on Innovation' (2018) NBER Working Paper No 24449 27.

<sup>128</sup> See N. 49.

<sup>129</sup> See N.119 at 741.

<sup>130</sup> Eswaran M, and N Gallini, 'Patent Policy and the Direction of Technological Change' (1996) RAND Journal of Economics 27(4): 722-746 <sup>130</sup> Ibid at 743.

combinations of drugs. In recognition of the vital protection patents offer and the potential to erode the global benefits of medical innovation, National and European courts decisions have considered this and concluded that, generally, such developments will not be defeated on the basis of novelty.<sup>131</sup>

#### **4.5. Critical Analysis of Patent Regime**

Patent law is outdated, inapplicable and irrelevant in the AI sphere.<sup>132133</sup> Allowing property rights to escape the confines of human attribution will dilute human innovation; overwhelmed by AI creations which will perpetuate and exacerbate existing difficulties within the patent system.<sup>134</sup> Firstly, from an economic standpoint, monopolies are a misallocation of societies resources and this market failure is susceptible to abuse; automated illegitimate efforts by corporations to enrich themselves at expense of society.<sup>135</sup> A majority of patents end up being unused, with only around 10% of patents holding commercial value.<sup>136</sup> Despite this, patent rights cover almost all commercial uses of the patented invention and are infringed regardless of whether or not the defendant copied exactly.<sup>137</sup> Resulting in reasonable industry

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<sup>131</sup> Andrew Charles Sparkes and others, 'Towards Robot Scientists for Autonomous Scientific Discovery' (2010) 2(1) Automated Experimentation 1-12.

<sup>132</sup> Lim D 'AI & IP: innovation & creativity in an age of accelerated change' (2019) Akron Law Rev 52:813-815.

<sup>134</sup> See N.122.

<sup>135</sup> L Zhang, J Tan, D Han, H Zhu 'From machine learning to deep learning: progress in machine intelligence for rational drug discovery' (2017) Drug Discovery Today Volume 22:11, 1680-1685.

<sup>136</sup> Basalla, G., *The Evolution of Technology*, (Cambridge University Press 1988), 69.

<sup>137</sup> P Klemperer P, 'How Broad Should the Scope of Patent Protection Be?' (1990) RAND Journal of Economics 21:113-30.

concern of AI systems amassing patents as leverage for profiteering, with no intention of exploiting the technology itself; driving up the cost of research and development.<sup>138</sup> The balance tips heavily in favour of individual gain, towards capitalist gains at the expense of society. The most notable controversy surrounds ANTIAIDS drugs,<sup>139</sup> where signatories to international agreements are obliged to provide enforcement procedures even where these patent rights are utilised to exploit and discriminate by demanding extortionate licence fees.<sup>140</sup>

Secondly, the Statute of Monopolies 1624 implemented the legal basis for the patent system in Britain as an incentive to innovate, coalesced with the need to limit the monopoly powers vested for the greater public interest.<sup>141</sup> However, there is little empirical evidence to support the patents ability to effectuate more technical innovations entering the public domain.<sup>142</sup> Furthermore, patents double as a sword and a shield. Utilised to disrupting the market; blocking new entrants, reducing the need for innovation and increasing costs – which

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<sup>138</sup> Written evidence from Medicines and Healthcare products Regulatory Agency (AIC0134); Braintree (AIC0074) and Dr Mike Lynch (AIC0005).

<sup>139</sup> L Zhang, J Tan, D Han, H Zhu, 'From machine learning to deep learning: progress in machine intelligence for rational drug discovery' (2017) *Drug Discovery Today* Volume 22:11, 1680-1685.

<sup>140</sup> Jon Kleinberg and others, 'Discrimination in the Age of Algorithms' (2018) 10 *Journal of Legal Analysis* 113, 136.

<sup>141</sup> Kitch, E W, 'The Nature and Function of the Patent System' (1997) *Journal of Law and Economics* 20:265-90; See for example *Darcy v Allin* (1602) 11 Co.Rep. 846.

<sup>142</sup> Eswaran, M. and N. Gallini, 'Patent Policy and the Direction of Technological Change' (1996) *RAND Journal of Economics* 27(4): 722-746; Study Contract ETD/99/B5-3000/E/106, [http://ec.europa.eu/internal\\_market/indrop/docs/comp/study\\_en.pdf](http://ec.europa.eu/internal_market/indrop/docs/comp/study_en.pdf), accessed July 2020.

will inevitably harm consumers and inventors.<sup>143</sup> Additionally, if the inherent threat of litigation was removed, there would be more resources available to research and development resulting in greater innovative powers at both the corporate and individual level.<sup>144</sup> In contrast to the western economies, the P.R.C's impressive economic growth is not grounded on the use of patents; contrariwise, their domestic patent system has grown as a result of economic growth.<sup>145</sup>

#### **4.6. Conclusion to the Chapter**

The UK IPO decision is not a surprise given the traditionally change adverse patent system but when read in the light of their strategy for AI development, it appears short sighted. There is widespread activism for an investigation to future proof patents by both industry and government actors and the extension of legal definitions to recognise AI contribution to the invention process is warranted.<sup>146</sup> Though, the ongoing uncertainty arguably casts doubt on the validity of inventions involving AI activity; with a detrimental effect to wider AI innovation.<sup>147</sup> Although, quite often cultural grounds precede practicalities. Conclusively, it has been shown that economic growth does not depend on patent rights as heavily as prescribed; in view of all

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<sup>143</sup> J Farrell, 'Arguments for Weaker Intellectual Property Protection in Network Industries' (2017) In Brian Kahin ed., Standards Policy for Information Infrastructure. 368-377. Cambridge, MA: MIT Press.

<sup>144</sup> See N.119.

<sup>145</sup> See N.97.

<sup>146</sup> Michael Kremer, 'Patent Buyouts: A Mechanism for Encouraging Innovation' (1989) Quarterly Journal of Economics 113:1137-67.

<sup>147</sup> The Chartered Institute of Patent Attorneys (CIPA), CIPA Artificial Intelligence Debate; A CIPA Discussion Paper 'Patenting Inventions created using an AI system' (2020).

the flaws in the patent regime, there is certainly a case to be made that there would be more innovation in its absence. Finally, in light of the Governments huge financial investment into AI innovation, there is a strong argument that society would benefit more if the works arising from taxpayer's money were placed into the public domain.

## **5. International Protection of AI-Generated Creations**

### **5.1. Introduction**

Patents are primarily domestic in their nature; with each nation having its own respective intellectual property office. Intellectual property rights are a valuable component of technological leadership, highlighting the importance of domestic considerations and international coordination.<sup>148</sup> Efforts by organisations, such as the WIPO, and transnational agreements such as the Agreement on Trade-Related Aspects of Intellectual Property Rights 1995 (TRIPS) to harmonise intellectual property law across the globe have proven effective, however there are persistent differences in the approaches at each stage of the application process. This has resulted in varying standards, requirements and protections. There is a global consensus from IP officers that rules should adequately protect and incentivise innovation in AI, with an acute recognition of the challenges that AI related inventions will bring.<sup>149</sup> Transnational cooperation will facilitate the sharing of ideas and 'know how', in turn reducing costs and increasing investment in safety, thereby encouraging pro-social behaviour and helping implement internationally agreed standards of excellence and safeguarding policies.

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<sup>148</sup> See N.3.

<sup>149</sup> WIPO, 'Conversation on Intellectual Property (IP) and Artificial Intelligence (AI) ISSUE 1,5. Available at [https://www.wipo.int/meetings/en/details.jsp?meeting\\_id=51767](https://www.wipo.int/meetings/en/details.jsp?meeting_id=51767) accessed July 2020.



Accordingly, this section will present a comparative analysis foreign jurisdictions' approach surrounding the convergence of IP and AI, beginning with a brief discussion of their respective published AI strategies. Moving then into a comparison and analysis of the recognition and practicable protection afforded to AI generated works therein; the driving forces behind the divergence will be elucidated, highlighting the need to strategically consult with wider innovation and international relation policies.

## 5.2. US

In early 2019 the US government launched their own AI initiative, seeking to promote and protect domestic AI technology and encourage innovation; coalesced with the desire to democratise and broadcast updates in national AI advancement.<sup>150</sup> It is important to note that the patent regime is heavily influenced by national security interests, not just economic incentives. America takes a semi-nationalist attitude and their two-step approach towards international cooperation has a chilling effect on bilateral research and cooperative innovation. This includes increasing trade barriers and onerous tariffs on foreign kit. Their legislation and jurisprudence generally favouring domestic commercial interests, coupled with a lapse in competition and privacy rules allows vastly powerful domestic AI systems with questionable biases to flourish.<sup>151</sup> Further, the US only claim authority to regulate the use of datasets in its

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<sup>150</sup> Policy Paper, Artificial intelligence for the American People (2019) <https://www.whitehouse.gov/ai/> accessed July 2020.

<sup>151</sup> See N. 124.

physical jurisdiction, resulting in a severe lack of accountability where these domestic AI software exploits foreign nation's data or its citizens.<sup>152</sup>

### **5.2.1. US Copyright Provisions**

Since autonomously generated music compositions and works of art appeared midcentury, US IP law has wrestled with the extension of authorship to non-human personalities. Though decidedly, as per the Copyright Office practice and interpretation of the copyright statute, it affords rights to humans and not animals.<sup>153</sup> Accordingly, US Copyright has developed doctrines of rejection to notions of non-human authorship.<sup>154</sup> Tentatively inferring the rejection of copyright would be extended to AI generated works; though the lack of court cases infers a reluctance to cast opinion on the matter. Yet, these doctrines do not have any statutory footing.<sup>155</sup> Rather, they are seated in decade old analysis of on computer capability; which when applied to modern AI are heavily outdated and palpably wrong. There is a lack of urgency or requirement to envelope AI into the copyright regime, despite the gap in protection afforded to companies thriving off AI innovation, demonstrating a clear need for legislative reform to fully enable protection for AI based creations. Though, in consideration of the US's more liberal policy towards data mining and the encouragement of opensource data

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<sup>152</sup> See N.

<sup>153</sup> *Naruto v. Slater*, No. 15-cv-4324, 2016 WL 362231 (N.D. Cal. Jan. 28, 2016).

<sup>154</sup> *Feist Publications, Inc., v Rural Telephone Service Co.*, (1991) 499 U.S. 340.

<sup>155</sup> UKIPO, WIPO Conference, Keynote Speech, Lord Kitchin, Justice of the Supreme Court, 18 June 2019.

sets, it appears that the nation has placed itself in a strong position to enable the commercial exploitation of copyright works for the benefit of research and development.

### **5.2.2. US Patent Regime**

In terms of legislative policy towards AI generated inventions, section 101-115 of title 35 of the US Code assert familiar notions of inventive, non-obvious and utility steps in line with the global stance and, as is typical for the Western force, US federal IP policy talks in language of intellectual dominance; inventorship is conferred on one who dominated the work leading to the conception of the invention.<sup>156</sup> Accordingly, there appears not legislative barriers to AI recognition, not even in the subject matter exclusions which ‘includes anything under the sun that is made by man[-kind]’.<sup>157</sup> Therefore, ostensibly, while inventorship will require material contribution to the conception, there is no discussion of the need for that contribution to be a natural person in either the guidelines or regulations at a federal level.<sup>158</sup> The judicial interpretation is likely to be heavily influenced by the Copyright doctrines of authorship; decisively blocking any recognition of AI inventorship in the without Congress overruling

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<sup>156</sup> Section 100(f) of the Patent Act, 35 U.S.C.A. § 100(f).

<sup>157</sup> *Diamond v. Chakrabarty* (1980) 447 U.S. 303.

<sup>158</sup> R M Hunt, ‘Patentability, Industry Structure, and Innovation’ (2004) *The Journal of Industrial Economics*, 52: 401-425. doi:[10.1111/j.0022-1821.2004.00232.x](https://doi.org/10.1111/j.0022-1821.2004.00232.x).

precedent and adopting a broader definition of inventorship.<sup>159</sup> This is not set in stone, however, as the government circulated notices requesting for comments on the issue.<sup>160</sup>

### **5.3. People's Republic of China (P.R.C)**

China recently announced its New Generation Artificial Intelligence Development Plan, outlining their strategy to become the world leaders by 2030 with a domestic AI economy worth c.\$150 billion.<sup>161</sup> China have outpaced the nearly all other nations in innovations relating to DNN – with substantial support from financial incentives from their government to encourage AI innovation.<sup>162</sup> Correspondingly, there is a relatively amicable approach and attitude towards AI generated works.

#### **5.3.1.PRC Copyright Provisions**

Chinese copyright law does not extend protection to creative works created by AI *prima facie*. Article 2 of PRC Copyright Law provides a necessary condition that works are created by a natural person. Though, the courts have not passed on the opportunity to consider AI in

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<sup>159</sup> Manual of Patent Examining Procedure (MPEP), Ninth Edition, Revision 08.2017, Last Revised January 2018, available at: <https://www.uspto.gov/web/offices/pac/mpep/s2137.html> accessed July 2020

<sup>160</sup> Request for Comments on Patenting Artificial Intelligence Inventions: A Notice by the [Patent and Trademark Office](#) on [08/27/2019](#).

<sup>161</sup> China's New Generation of Artificial Intelligence Development Plan (2017) <https://flia.org/notice-statecouncil-issuing-new-generation-artificial-intelligence-development-plan/> accessed July 2020; See N. 6. Supra. Interestingly this is over half of the estimated value of the global AI economy in the next decade.

<sup>162</sup> Lulu YiLun Chen, "China Claims More Patents Than Any Country—Most Aare Worthless." (2018) Bloomberg. Available at <https://www.bloomberg.com/news/articles/2018-09-26/china-claims-more-patentsthan-any-country-most-are-worthless> Accessed 13 June 2020

the context of copyright,<sup>163</sup> accepting that some sort of protection to AI generated works should be available both to avoid the negative affect on the distribution of such content and in recognition of the investment and the societal value of the works. Consequently, the Eastern courts have taken an adaptive approach to ensure that valuable works do not go without protection. For instance, in the case of *Feilin v Baidu*,<sup>164</sup> where AI generated content failed to warrant the grant of authorship to the AI creator, the courts found copyright belonging to the human team behind on the account of the content was manually modified by the production team. Comparably, in *Shenzhen Tencent v Yinxun*,<sup>165</sup> the court ruled that AI generated work, an article written by a licensed an intelligent writing assistance AI system named ‘Dreamwriter’, was a literary work and warranted copyright protection but had difficulty any substantial human contribution in the creation. Consequently, the courts found the corporate entity utilising the intelligent software to be the recognised author of the work – as the work was the result of activities carried out on behalf of the applicant. This adaptive and flexible application of the law is commendable and highlights the forward-thinking ethos the eastern provinces have. Though it is arguable that these judicial findings do not offer substantial

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<sup>163</sup> M Chen, ‘Beijing Internet Court denies copyright to works created solely by artificial intelligence’(2019) Journal of Intellectual Property Law & Practice, Vol. 14, No 8.

<sup>164</sup> *Beijing Feilin Law Firm v Baidu Corporation*, No 239 [2019] Civil First Instance, Beijing Internet Court, 25 April 2019.

<sup>165</sup> Bhavik Shukla & Hatim Hussain, ‘Shenzen Tencent v. Shanghai Yinxun: AI Authors, Copyright and Some (Hard) Lessons for India’ SpicyIP Available at <https://spicyip.com/2020/08/shenzen-tencent-v-shanghai-yinxunai-authors-copyright-and-some-hard-lessons-for-india.html> accessed July 2020. Chinese Court transcript available at <<https://mp.weixin.qq.com/s/jjv7aYT5wDBIdTVWXV6rdQ>>

commercial protection, rather it lends credibility to the work; inflating the hype surrounding China's domestic AI innovations.<sup>166</sup>

### **5.3.2.P.R.C Patents Regime**

There are some fundamental differences which make comparing patents with the other jurisdictions challenging. Firstly, the majority of patents filed in China are classified as 'Utility Patents', which are subject to less vigorous inspections and a generally perceived, lower requirement of inventiveness and provide a lesser ten-year protection period.<sup>167</sup> Rule 13 of the Implementing Regulations of the Chinese Patent Law determines inventorship as 'creative contributions to the substantive features of an invention'. These are features that distinguish the invention from the prior art and render it non-obvious, but creative contributions are not defined in Chinese patent law, nor their implementing regulations and guidelines.<sup>168</sup> As there is still likely to be human contribution and ultimate human conception of the idea that underpins the invention, there has been no need for legislative intervention, enabling the courts to take an adaptive stance which accurately represents AI's contribution. Though, it does make the regime receptive to future recognition of AI inventorship.

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<sup>166</sup> See N.153,

<sup>167</sup> Nathan Calvin and Jade Leung, 'Who owns artificial intelligence? A preliminary analysis of corporate intellectual property strategies and why they matter' (2020) Centre for the Governance of AI Future of Humanity Institute, University of Oxford. Available at [https://www.fhi.ox.ac.uk/wp-content/uploads/Patents\\_FHI-Working-Paper-Final-.pdf](https://www.fhi.ox.ac.uk/wp-content/uploads/Patents_FHI-Working-Paper-Final-.pdf) accessed July 2020.

<sup>168</sup> AIPPI China Report on Inventorship of Multinational Applications, 07-06-2015, Part II, Section 8. Available at <http://aippi.org/wp-content/uploads/committees/244/GR244china.pdf>.> accessed July 2020.

## **5.4. E.U Approach**

The unanimously cooperative approach of all member states to AI development is centred around preserving E.U technological leadership.<sup>169</sup> Consequently there is an air of optimism as to whether the European Patent Convention (EPC) and the European Patent Office (EPO) are ready to handle the changes and challenges AI will bring. With commentators highlighting the adaptable existing legal norms supported by access to public sector data which enable scientific breakthrough. The EPO had the opportunity to consider recognising AI inventorship but disregarded the EU Parliament's call for an "electronic personality" to recognise advanced AI.<sup>170</sup> Quickly aligning itself with the UK IPO decision to require a natural person to be named inventor. Consequently, there is a degree of latency in an implementation of a coordinated and coherent strategy towards AI leadership.

### **5.4.1.E.U Copyright Provision**

The EU copyright regime focuses on whether the work is the author's 'own intellectual creation'.<sup>171</sup> Despite different member state approaches, it can be inferred from CJEU case law that the work must reflect the author's personality.<sup>172</sup> This human centric view is further clarified

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<sup>169</sup> European Commission, EU Member States Sign Up To Cooperate On Artificial Intelligence, (Apr. 10, 2018), <https://ec.europa.eu/digital-single-market/en/news/eu-member-states-sign-cooperate-artificialintelligence>, archived at <http://perma.cc/VZ7X-RTS7>, accessed July 2020.

<sup>170</sup> European Parliament resolution of 16 February 2017 with recommendations to the Commission on Civil Law Rules on Robotics Available at ([2015/2103\(INL\)](#)). Accessed July 2020.

<sup>171</sup> Case C-5/08 *Infopaq International A/S v Danske Dagbaldes Forening* [2009] ECR I-6569.

<sup>172</sup> J. C. Ginsburg, 'The Concept of Authorship in Comparative Copyright Law' (2002) 52 DePaul L. Rev. 1063. See for example, Ley 22/11 sobre la Propiedad Intelectual de 1987.

when read in light of Article 2.6 Berne Convention, clearly envisaging the identified ‘author’ being a human person.<sup>173</sup> This personal approach to the originality rules out copyright arising in machine automated output where there is a demonstrable lack of personality impressed from the operator.<sup>174</sup> Originality requires expression of free and creative choices in the production.<sup>175</sup> However, given the human centric view the complex selection process by which AI determines its output is unlikely to warrant originality within EU law. Works arising from the literal free and creative choices attributed to the AI system,<sup>175</sup> rather than the causal actions of the human counterpart, will not qualify for copyright protection nor will AI assisted creations as seen in the England and Wales.<sup>176</sup> Furthermore, Art 4(1) of the Text and Data Mining Directive prohibits commercial uses such as reproduction of the work as the work and data mining without consent. This effectively facilitates a derivative data market, in which right holders can restrict use in return for licence fees. Although, the infringement is arguably a transient element of the ML process.<sup>177</sup> Therefore, the commercial benefits arise from the results of the ML process and not copying the works per se. Consequently, the lack of intervention ensuring a fair and reasonable access inevitably placing AI developers

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<sup>173</sup> Reto M. Hilty, ‘European Copyright, quo vadis? Impact of Artificial Intelligence on copyright issues: Criteria for protection’ (2018) Bruxelles.

<sup>174</sup> C. Handig, ‘The copyright term "work" - European harmonisation at an unknown level’ (2009) 40 IIC 665, 668.

<sup>175</sup> Case C-145/10 Eva-Maria Painer v Standard Verlags GmbH & Others [2010] ECR I-12533

<sup>175</sup> See N.170, at [48].

<sup>176</sup> Tatiana Eleni Synodinou, ‘AI Intelligence: Criteria for protection’ Associate Professor, Department of Law, University of Cyprus (ECE 2019).

<sup>177</sup> Frank A. DeCosta, III, Ph.D.; Aliza G. Carrano ‘Intellectual Property Protection for Artificial Intelligence’ (2017) Westlaw Journal Intellectual Property, Available at <https://www.finnegan.com/en/insights/articles/intellectual-property-protection-for-artificial-intelligence.html> accessed July 2020.



within the scope of European law at a competitive disadvantage against countries like the US and China, and the UK, whose lack of similar domestic laws provide much greater freedom to utilise data mining in AI development.<sup>178</sup> In light of the new Commissions aspiration for technological leadership,<sup>179</sup> the legal uncertainty is unsatisfactory and not conducive towards AI innovation.

#### **5.4.2.E.U Patents Regime**

The legal position in Europe is governed by the EPC. With the general requirements for patentability set out in Article 52. The EPO updated its manuals to accommodate AI, rather inhospitably; requiring the designation of a natural person. However, the precise legal definition of a natural person is absent, left to national courts to interpret this as they see fit. Which is at odds with the harmonisation of Member State law. Furthermore, the EPO quite rightly considers AI models to be in line with computational models and algorithms, and therefore excluded as mathematical methods.<sup>180</sup> Though, this doesn't address the issue that these computational models are capable of devising protection-worthy inventions, as has been demonstrated. Additionally, requiring a human to be acknowledged as an inventor of AI generated inventions is arguably against the economic reality, and ostensibly contradictory to regulation 19(2) which states the EPO shall not verify the accuracy of the designation of the

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<sup>178</sup> Dr N Shemtov, 'A study on inventorship in inventions involving AI activity' (2019) Intellectual Property and Technology Law, Centre for Commercial Law Studies, Queen Mary University of London (Commissioned by the European Patent Office).

<sup>179</sup> European Commission, 2017b. Digital Transformation Monitor. AI Policy Seminar: Towards an EU strategic plan for AI 29 November 2017.

<sup>180</sup> EPO, 'Guidelines for Examination 3.3.1 Artificial intelligence and machine learning'. Available at [https://www.epo.org/law-practice/legal-texts/html/guidelines2018/e/g\\_ii\\_3\\_3\\_1.htm](https://www.epo.org/law-practice/legal-texts/html/guidelines2018/e/g_ii_3_3_1.htm) last accessed 13<sup>th</sup> July 2020.

inventor.<sup>181</sup> Consequently, the EUIPO is patently encouraging applicants to falsely accredited themselves for work which they had a limited part in devising; which will almost certainly mislead the public.

## **5.5. Conclusion to the Chapter**

Conclusively, extending authorship rights to AI is neither warranted, nor desired on a global stage. Despite lamented strategic goals, in view of the above, there appears to be a disconnect between the modern technological state of AI and the questions raised by Western policy makers concerning the extension of rights towards it. Despite their adversarial relationship, it appears that the PRC and the US have some threads of similarity; with amicable and adaptive national regimes which will continue to encourage innovation and legislative flexibility poised and equipped for the technological revolution which supports their bid for technological leadership strategy - though China's more strategic plan is more uncompromisingly pursued. Contrariwise, there is a lack of coherent governmental strategy among Europe and the UK, with their complicated intricately inter-woven relationship holding fast and hindering any goals of sovereignty and technological leadership.<sup>182</sup> Consequently, there are gaps in IPR approaches recognition and, therefore, the protection of AI. With divergence in application inevitably exacerbating the economic gap; enabling a springboard for leading economic and private entities to jump ahead in the technological race. Consequently, AI developers will be forced to employ adaptive IP strategies to achieve the protection and

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<sup>181</sup> Szaploneczay, M., Ożegalska-Trybalska, J., & Kasprzycki, D. (n.d.). Patenting AI related inventions - the European approach.

<sup>182</sup> See N.178 at 17.

recognition needed in the fast-changing competitive landscape. Accordingly, considering the influence IPRs have on shaping the strategic landscape and the competition and cooperation among AI developers and prominent national governments, there is a need to comprehensively examine IP's role in AI innovation. The divergence in approaches, driven by sovereignty in the face of technological change will continue to fragment geopolitics and intensify existing sparring sessions between global powers; obstructing meaningful prospects of coordination among actors to achieve pro-social objectives in respect of ethical deployment and suitable governance of AI.

## **6. Conclusions**

### **6.1. Summary and Identification of Challenges**

The convergence of AI and IPR is not just a nationwide issue, it is a global one. AI has displayed its ability to benefit society as a whole and algorithmic determination is already filtering into the legal system; carrying out profiling and automated decision-making.<sup>183</sup> Accordingly, there a global consensus on the need for institutional mechanisms to implement a standardised approach to the recognition and governance of AI; but a lack of meaningful impactful regulatory guidance.<sup>184</sup> As it stands accountability and trust rely on responsible engineering. The industry has shifted the burden of any statistical uncertainty on to the AI developers, placing an obligation on AI developers to explain the decision-making process

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<sup>183</sup> Estonia Plans To Give Robots Legal Recognition, The Independent (2017), at <https://www.independent.co.uk/news/business/news/estonia-robots-artificial-intelligence-ai-legalrecognition-law-disputes-government-plan-a7992071.html>.

<sup>184</sup> ICO; Project explAI In Interim Report; <https://ico.org.uk/media/about-the-ico/documents/2615039/projectexplain-20190603.pdf>

and.<sup>185</sup> Yet, as the argument goes, if technology is feasible it will be developed regardless of law, ethical concerns, or speculative future risk and it is unreasonable to expect commercial actors to be the arbiters of ethical policies.<sup>186</sup>

Regulation is within the remit of every government,<sup>187</sup> yet there is a lack of satisfactory leadership by example; especially in the UK. Wherein governmental bodies have deployed AI systems on the public without legal basis, oversight or any overarching governmental strategy.<sup>188</sup> The Court of Appeal (CoA) had the opportunity to scrutinise the use of facial recognition by police in *Bridges v South Wales Police*.<sup>189</sup> The CoA considered the human rights implications and unanimously found a lack of adequate procedural checks

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<sup>185</sup> Daniel Schönberger, 'Artificial intelligence in healthcare: a critical analysis of the legal and ethical implications' *Int J Law Info Tech* (2019) 27 (2): 171, at 187.

<sup>186</sup> Castelluccia, C. and Le Métayer, D. 'Understanding algorithmic decision-making: Opportunities and challenges', *STUDY- Panel for the Future of Science and Technology*, 2019.

<sup>187</sup> Tom R Tyler, 'Compliance with Intellectual Property Laws: a Psychological Perspective' (1997) 29 *NYU KJ Int'l & Pol* 219, 540.

<sup>188</sup> A Babuta, and M Oswald, 'Machine learning predictive algorithms and the policing of future crimes: governance and oversight In Policing and Artificial Intelligence' (Dr John L.M. McDaniel and Prof Ken Pease OBE, eds., Routledge, Forthcoming 2020) Available at <https://poseidon01.ssrn.com/delivery.php?ID=297024085004102027022078095094083099024027003059021038093121000009024126091031101022021026029022118061047124121104119097065093044038034079014002025083066090099099076035053051120122026005007124089100082081107115029077004022024124013109089065065021082106&EXT=pdf> accessed July 2020.

<sup>189</sup> [2020] EWCA Civ 1058.

and balances to ensure that there is no unacceptable bias in race or gender, highlighting the lack of transparency of data upon which the systems were trained.<sup>185</sup>

## **6.2. Suggestions**

In accordance with the aforementioned conclusions, these advanced intelligent machines demonstrably create novel inventions and works that could, and arguably should, qualify for protection. There are therefore two flanking issues for policy makers to address. (1) to ensure the IPRs are suitably applicable and utilised to afford the much-needed recognition and protection to AI; facilitating a careful balance of incentivisation and dissemination to society, which as is argued should heavily favour the latter. (2) Is the responsibility of state actors to ensure the ethical development, deployment, and application of AI.

### **6.2.1. Recognising AI is Beneficial and the Justifications**

Utilising a similar doctrine to the one found in company law which recognises separate legal entities in the realms of AI could achieve multiple policy objectives. Firstly, the recognition and rights could achieve legal certainty, benefiting developers and in turn drive a flurry of AI development within countries that sponsor such an approach.<sup>186</sup> Secondly, in the strive for accuracy and transparency, it would mute the discussion of whether authorship lies with the writer or the pen. Finally, the recognition of AI as an inventive being could also aid

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<sup>185</sup> A Babuta, M Oswald, and Rinik C, 'Machine Learning Algorithms and Police Decision Making: Legal, Ethical and Regulatory Challenges' (2018) RUSI Whitehall Reports, 3-18. London: Royal United Services Institute

<sup>186</sup> Dr Oliver Baldus, 'A practical guide on how to patent artificial intelligence (AI) inventions and computer programs within the German and European patent system: much ado about little' European Intellectual Property Review, 2019, 41(12), 750-754.

governmental control, providing an officious register of AI inventors and their inventions. However, this approach risks imposing aggregately larger detriment on parties externally. Within our current legal order there is a very real risk that these advanced autonomous systems could morph and obtain many private-law rights of legal persons by means of these limited liability companies.<sup>187</sup> Accordingly, there are grave policy concerns regarding the extension of legal rights to non-human entities. To afford a corporate veil to exist between AI deployment and holding a human responsible is certainly unsatisfactory. Therefore, while the recognition of machine intelligence and its contribution to society is a useful tool, the exact scope and parameters of any legal rights afforded must be heavily scrutinised.

#### **6.2.2. Achieving Lateral Transfer of Information**

There are strong existing legal rubrics which could be utilised to further enhance lateral transfer of information; encouraging international cooperation and coordination. Standard essential patents (SEP) underpin vast swaths of the cyberspace already.<sup>188</sup> A patent claiming technology which is essential to an industry's standard; for instance SEPs make up the substrate of cables ensuring telecommunications are deployed like for like across the nation.<sup>189</sup> Leading the way towards the global homogenisation of AI by ensuring a degree of standardised AI

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<sup>187</sup> Shawn Bayern 'The Implications of Modern Business-Entity Law for the Regulation of Autonomous Systems' 19 Stanford Technology Law Review 93 (2015).

<sup>188</sup> Alison Jones (2014) Standard-Essential Patents: Frand Commitments, Injunctions and the Smartphone Wars, European Competition Journal, 10:1, 1-36.

<sup>189</sup> See N. 178 at 34.

deployment. Moreover, there is a real economic value to nations imposing such a licence requirement; in 2019 European SEP's generated revenue of €101bn.<sup>190</sup>

### **6.2.3. Ensuring Ethical Deployment**

There is a need for a coordinated law to ensure that artificial intelligence (AI) is developed and deployed for the benefit of all humanity and in the service of internationally shared ethical ideals. To achieve this, AI's autonomous and objective nature could be harnessed to regulate output and ensure adherence to ethical ideals,<sup>191</sup> embedding a mandatory immutable technical layer into the AI software which evaluates outcomes against internationally agreed metrics and adjusts accordingly. This is governed by flexible policies which allow variations of default settings and rigorous immutable policies embedded within the neural networks which cannot be altered,<sup>192</sup> safeguarding citizens from discrimination, prejudice, and the perpetuation of societal hierarchy.<sup>193</sup> However, the mandatory requirement would only have real prospects of success if there was just and open negotiations inclusive of narrow interest groups to carve out shared ethical ideals. Legal analysis has shown the existence of impressionable legislative frameworks which are frequently updated to adapt to the dynamic geopolitical regulatory order.

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<sup>190</sup> Heiden, Bowman. 'Valuing Standard Essential Patents in the Knowledge Economy: A Comparison of F/RAND Royalty Methodologies in U.S. Courts. Sustainable Business: Concepts, Methodologies, Tools, and Applications' (2020) IGI Global pp. 1594-1625.

<sup>191</sup> Joel Reidenberg, 'Lex Informatica: The Formation of Information Policy Rules through Technology' (1998) 76 Tex L Rev 568.

<sup>192</sup> See N. 181.

<sup>193</sup> K Yeung, 'Algorithmic regulation: A critical interrogation' (2018) Regulation & Governance, 12(4), pp.505-523.

These align closely with the aims and objectives of SEP's and international agreements such as TRIPS, for example.

#### **6.2.4. How the English Courts Can Pioneer Global Homogenisation**

The appropriateness of the English courts to initiate this project is exemplified in light of the recent landmark Supreme Court Decision in *Unwired Planet International Ltd v Huawei Technologies (UK) Co Ltd*.<sup>194</sup> Where it was explicitly held that English courts have jurisdiction to determine global market rates for standard essential patents.<sup>200</sup> Establishing a market rate, or licence fee, and enabling a global platform upon which these mandatory SEP's could be enforced as compulsory licences on fair, reasonable and non-discriminatory terms.<sup>195</sup> Though, there are some issues to be considered. Firstly, this technical equality layer would need to pass the threshold for patentability; more specifically its technical effect must be sufficiently discernible and, of course, inventive. Secondly, the concurrent observation of data streams would raise significant privacy concerns. Requiring serious data protection and as a result would require an exceptionally tightly controlled joint enterprise between international states.

### **6.3. Conclusion**

Deep neural networks can be considered autonomous learning agents, on account of their capacity to learn with much less manual interference.<sup>196</sup> While the designer has complete

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<sup>194</sup> [2020] UKSC 37 <sup>200</sup>

Ibid at para, 62.

<sup>195</sup> Ibid at para, 65 where the UKSC also recognised foreign courts willingness in principle to set global rates for SEP's.

<sup>196</sup> See N.32.



control over the arrangement of the overall network and the weighting of each receptor, the machine autonomously assimilates the data and provides an output over which the programmer has no direct influence. Coupled with the theory of connection between feedback and intelligence, these advanced machines' exhibit the ability to be intelligent, discover, and create things never before conceived. However, the analysis and exploration of IPRs across the globe has demonstrated that copyright in its orthodox form appears singularly not suited to AI or cyberspace. The extension of authorship to non-human entities is antipathic to its primordial function - recognising and enabling human creativity.

The technical nature and functions of patents offer a more appropriate and robust form of protection; despite the modern challenges when considering concepts of inventorship inventiveness, and obviousness. It is argued AI should be recognised; it is not entirely accurate to name the human developer as the inventor; creating a legal fiction of entitlement through use. However, the majority of political and industry contributors deny that the orthodox notion of authorship should ever extended to AI systems. Consequently, the legal order will consider AI as part of the augmented intelligence of the human designer for the foreseeable future.

Nevertheless, in consideration of the other recognised legal personalities, recognising AI inventorship may not deviate too far from existing legal norms. While the dangers of extending human accolades to non-human entities is acknowledged, the pathways to global growth lies in the acknowledgement, adaption and amicable reception to change. The interests of society and encouragement of technology innovation are better served by the lateral transfer of information. In balance of competing objectives of incentive theory and the greater public

good, however, it is argued the current structure of monopolistic powers lean heavily towards favouring the individual.

IP rights continue to have their place on the geopolitical stage - conducive both to micro and macro-economic growth and intrinsic to society as a reward system - although legislative policy must align with governmental strategy for any real prospect of successful technological leadership. Society as a whole bares the risk and it is therefore fair to suppose a global benefit. IPR's amenability makes their adaption possible, smoothing the transition through the next revolution and strive towards acceptable levels of global homogenisation. Existing arms of the IP regime have demonstrated their ability to accommodate new regulations centred around social ethics. With ethical regulations embedded into the neural network, utilising the intelligent and objective nature of AI to detect and account for discrimination and avoid catastrophic errors. However, this would require a deviation from the human centric view to recognise AI as an economic entity. While this is conceded to be a relatively fictional narrative - for the time being - given the uncharted territory policy makers must cross, the use of a marginally fictional narrative may be necessary to adequately facilitate and invigorate innovation, encourage lateral transfer of information, and impose order to protect society and the public at large.

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