Article III: Härkönen, Heidi: Fashion piracy and artificial intelligence–does the new creative environment come with new copyright issues? *Journal of Intellectual Property Law & Practice,* 2020, Volume 15, Issue 3, p. 163–172, by permission of Oxford University Press (Härkönen 2020b).

Fashion piracy and artificial intelligence—does the new creative environment come with new copyright issues?

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1. Introduction

Artificial intelligence (AI) is slowly changing the world of creativity. Nowadays algorithms are capable of creating works that previously were created solely by human authors. For instance, creative outputs by writers, journalists, musicians, artists and designers are being challenged by AI-generated works.[1] The development of AI not only changes the world of design process but also creates new difficulties for the copyright system, which is primarily created to protect the creative endeavours of human creators.[2] Thus, the changes caused by AI to the professional environment in creative industries raise questions regarding copyright law as well.

The fashion industry provides a particularly fascinating research context for contemplating the copyright issues related to the use of AI. AI has made its way into almost every segment of the fashion value chain, from product discovery to robotic manufacturing.[3] Fashion, on the other hand, is an extremely IP-intensive industry, which is known for its complex copyright

This article

- The development of artificial intelligence (AI) poses challenges to the copyright system, which is primarily created to protect the creative endeavours of human creators. Fashion is an extremely IP-intensive industry, known for its complex legal environment. The increasing use of AI in the industry is likely to cause even further copyright issues.

- This article discusses the different ways in which AI can be used in fashion design and analyses the copyright-related problems linked to such use. Due to the fashion world being notorious for its copying issues, this article has a particular focus on potential copyright infringements related to the use of AI. Because of the lack of human authorship, AI-generated fashion designs seem to be more vulnerable to copying than human-created designs. The article concludes that creating more copyright-free space in the area of fashion would not be ideal, since it might boost fast-fashion copying even more and, thus, have a negative effect on the sustainable development of the industry.

- The article presents different options as to how the copyright system might treat AI-generated fashion designs, taking into account also the question of sustainability. Furthermore, it suggests optimal copyright law solutions to deal with AI fashion designer.

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1 A Guadamuz, 'Artificial Intelligence and Copyright' *WIPO Magazine* (Geneva, May 2017) 17.

2 A Alén-Savikko, R Ballardini and T Pihlajarinne, 'Tekoälyn tuotokset ja omaperäisyysvaatimus – kohti koneorientoitunutta tekijänoikeutta?' [Automated Content Production and Originality in Copyright Law – Towards a Machine-oriented Regime?] (2018) 116 Lakimies 975, 976; M Kaminski, 'Authorship, Disrupted: AI Authors in Copyright and First Amendment Law' (2017) 51 University of California Davis Law Review 589, 594.

3 L Luce, *Artificial Intelligence for Fashion* (Apress Media LLC 2019) xxv.

environment.[4] The increasing use of AI in the industry is likely to stir the pot even more, and perhaps even increase fashion copying. This creates a need to take a further look at the copyright issues that may arise, and how do these issues affect the industry on a larger scale.

This article discusses the different ways in which AI can be used in fashion design and analyses the copyright-related problems caused by such use from the European Union (EU) copyright law perspective. The focus is solely on fashion, although many of the conclusions stated can be applied to other industrial arts. The perspective of the so-called 'pure arts', such as painting, sculpture, music and literature, is excluded from the scope of this research. The reason for focussing on fashion designs and excluding pure arts out is that: (i) unlike pure arts, fashion designs tend to be mass-produced and have a very commercial nature; and (ii) their ability to receive copyright protection has historically been rather challenging.[5] Due to the fashion world being notorious for low-cost retailers blatantly 'knocking off' creations by high-end and indie fashion designers,[6] this article concentrates particularly on copyright infringement issues related to the use of AI. It presents different options as to how the copyright system might treat the kind of situations that involve an AI designer and that could be viewed as copyright infringements. The article furthermore takes into account-related questions of sustainability. Currently, the fashion industry is one of the most polluting industries in the world.[7] The total greenhouse gas emissions from textile production are more than those of all international flights and maritime shipping combined.[8] Hence, one could state that sustainability is probably the most significant challenge of today's fashion industry and cannot be excluded when considering the future legal environment for the industry.[9] It is thus important to consider how the development of AI changes the

market for copyright content due to low-cost mass production of works that look and function like human-created works.

This article is structured as follows: Section 2 presents how AI can be used in fashion design and provides some examples of such use. Section 3 focuses on the copyright issues related to the use of AI in fashion design, with a particular focus on infringement aspects and copying. Further analysis of copyright law and suggested measures to deal with AI creativity are presented in Section 4. In the final section, the article concludes that creating more copyright-free space in the area of fashion, by excluding AI-generated fashion designs from the scope of copyright protection, would not be ideal, since it might boost fast-fashion copying even more and, thus, have a negative effect on the sustainable development of the industry. Instead, the copyright system should protect AI-generated fashion designs that are creative and would be considered original in the eyes of copyright law in a case where the same designs were created by a human author.

2. The use of AI in the fashion industry

The development of AI and digitalization, in general, open up massive opportunities in the fashion industry from designing to manufacturing and sales.[10] Most of the potential is not even being utilized yet since, until now, the majority of the fashion industry has been rather slow in adapting the latest technology that could benefit the designing and sales process.[11] The use of AI in the fashion industry can be roughly divided into two different categories: use in the retail process and use in the designing process. Since creating new clothing designs admittedly involves more potential copyright issues than fashion retail, which is principally concerned with boosting the sales process especially in the

4   See, eg K Raustiala and C Sprigman, 'The Piracy Paradox: Innovation and Intellectual Property in Fashion Design' (2006) 92(8) Virginia Law Review 1687; CS Hemphill and J Suk, 'The Law, Culture and Economics of Fashion' (2009) 61(5) Stanford Law Review 1147; S Scafidi, 'Intellectual Property and Fashion Design' (2006) 1(115) Intellectual Property and Information Wealth 115; S Teilmann-Lock and T Petersen, 'Louboutin's Red Sole Mark and the Logics of Fashion' (2018) 13(11) JIPLP 890. See also Fashion Law Special Issue of *Journal of Intellectual Property Law & Practice* (2018 13(11) JIPLP).

5   H Härkönen, 'Muoti tekijänoikeudellisena teoksena: näkökulmia käyttötaiteen teoskynnykseen ja kopiointiin Suomessa' [Fashion as a Copyright Protected Work: Perspectives to the Copyright Threshold and Copying of Applied Art in Finland] (2018) 99 Defensor Legis 908, 910, 918–21.

6   See, eg C Sprigman, 'Some Positive Thoughts about IP's Negative Space' in K Darling and A Perzanowski (eds), *Creativity Without Law* (NYUP New York 2017) 249, 256; Raustiala and Sprigman (n 4) 1705–17.

7   V Jacometti, 'Circular Economy and Waste in the Fashion Industry' (2019) 8(4) MDPI Laws 27, 1–3, 5.

8   Ellen MacArthur Foundation, 'A New Textiles Economy: Redesigning Fashion's Future' (2017); McKinsey & Company, 'Style That's Sustainable: A New Fast-Fashion Formula' (2016).

9   See, eg G Noto La Diega, 'Can the Law Fix the Problems of Fashion? An Empirical Study on Social Norms and Power Imbalance in the Fashion Industry' (2018) 14(1) JIPLP 18, 19.

10   T Üstünkaya, 'Artificial Intelligence: Friend or Foe to Fashion in Consideration of the Functionality Doctrine?' (2020) 42(1) European Intellectual Property Review 13, 13–14, 18.

11   S Black, 'Sustainability and Digitalization' in A Geczy and V Karaminas (eds), *The End of Fashion* (Bloomsbury Visual Arts 2019) 113, 123. According to Black, the reason for the slow development is that the fashion industry 'likes how it works'. There is a concern that digital would replace craft methodologies, even though the challenges of fashion traditions are acknowledged. Instead of replacing craft methodologies, digital technology could be integrated in a way that would enhance a designer's practice (ibid 123).

online environment, this article focuses on some of the possible uses of AI in fashion designing.[12]

It is difficult to give a complete list of all of the conceivable ways in which AI can be used in fashion design, since the options are nearly endless. However, some possibilities that are relevant today or in the near future are presented in this section. This section reveals that currently, AI is mostly used in the designing process as an assistant to creativity rather than being itself the source of creativity. Regardless, AI programs are becoming more and more effective assistants for human designers, and their capability to perform more independent work is being developed continuously. Hence, it is likely that in the future, AI will become a principal source of new designs. In this article, the different ways in which AI can be utilized in designing and producing fashion are divided into three different categories: (i) AI applications that help fashion houses to predict current and future trends in order to create clothes that are in high demand; (ii) AI applications that assist human designers in styling and creating clothes; and (iii) AI applications that perform independent design work. Categorizing AI applications in the aforementioned way is necessary, since the level of independence and human interference that AI has in the designing process has an effect on how copyright law treats the designs it generates.

2.1. Guiding the design process by predicting current and future trends

Trend forecasting is perhaps the most important way of using AI in the current fashion industry. The purpose of trend forecasting is to predict, for example, what kind of colours, silhouettes, materials and styles will be popular in the future.[13] AI-based trend forecasting utilizes data mining, which is the process of uncovering patterns in large amounts of data. In copyright terms, a definition of data mining can be found from the newly adopted DSM Directive.[14] Article 2(2) defines text and data mining as 'any automated analytical technique

aimed at analysing text and data in digital form in order to generate information which includes but is not limited to patterns, trends and correlations'.[15] In trend forecasting, data mining methods and tools can provide building blocks for predictive analysis. Especially social media sources, like Instagram and Pinterest, are extremely important for data mining purposes, since they can reveal how customers feel about products and trends.[16] Leanne Luce, the author of the book, *Artificial Intelligence for Fashion: How AI Is Revolutionizing the Fashion Industry* describes data mining based trend forecasting as 'the step of discovering raw materials for a project'.[17]

The benefit of AI in trend forecasting is that it can deal with significantly larger amounts of data than a human brain. Fashion houses and merchants such as H&M, Zalando, Amazon and Levi's among others are already using AI to predict future trends.[18] It should be noted, however, that trend forecasting is not fashion designing itself, but it can definitely affect a human designer's work by guiding it to the direction that is as fashionable as possible. In other words, trend forecasting can tell what consumers would be likely to find appealing.

2.2. AI as an assistant to creativity

AI solutions provide rather helpful tools for fashion designers in their creative work. The examples of AI solutions that are presented in this section are indeed effective assistants for human creativity, but it is not likely that they would be able to independently generate original works in the copyright sense.

For example, AI provides a possibility to customize a garment based on an individual consumer's preferences. Imagine a consumer who is browsing through an e-commerce site, where a fashion brand is selling its garments and accessories. By using the consumer's browsing and purchase history, it is possible for AI to customize and display pre-existing, available designs in a way that would please the consumer.[19] For example,

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12 In retail, AI is often used to boost e-commerce. For instance, a virtual fitting system fills a major gap between e-commerce and retail. Recommender system implementations recommend new items based on user's browsing history. AI can also suggest completing accessories for a particular garment that a user just clicked to their shopping chart, luring the user to spend more money on the site. Hence, AI can work as a virtual stylist for an e-commerce fashion consumer. These possibilities to use AI in retail enable a highly personalized shopping experience for customers.

13 Luce (n 3) 141.

14 Directive (EU) 2019/790 of the European Parliament and of the Council of 17 April 2019 on copyright and related rights in the Digital Single Market and amending Directives 96/9/EC and 2001/29/EC, OJ L 130, 17 May 2019, p. 92–125.

15 The copyright implications of data mining are analysed in Section 3.2.

16 Luce (n 3) 14, 144.

17 ibid 144.

18 Reuters, 'Back on Trend? H&M Makes AI, Loyalty Drive to Ride Fashion Cycle' (17 April 2019) <https://www.reuters.com/article/us-h-m-strategy-ai/back-on-trend-hm-makes-ai-loyalty-drive-to-ride-fashion-cycle-idUSKCN1RT1U7> last accessed 19 December 2019; MarketWatch, 'Here's How AI and Data Analytics Changing the Apparel Retail Game' (20 February 2019) <https://www.marketwatch.com/press-release/heres-how-ai-and-data-analytics-changing-the-apparel-retail-game-2019-02-20> last accessed 19 December 2019.

19 This sets certain demands and challenges for manufacturing. In order for a fashion house to be able to customize its designs for individual consumers, the manufacturing process needs to be quick and flexible. In a world where most of the clothes are pre-made according to standard measurement charts, customizing a design for an individual will also be

by analysing the consumer's browsing history, AI can discover that the consumer likes to buy minimalistic dresses in yellow colour. When this consumer is viewing a minimalistic dress that is offered in white, blue and red, AI can customize the design and display it in yellow as well because it can predict that this particular consumer would find it appealing. This kind of customization, however, can hardly be counted as creative work in the copyright sense. It could merely be defined as bringing already existing creative works to the consumer's attention and making the garment at issue more attractive to them.

Furthermore, AI can help a designer to turn sketches into colour images. This is called image-to-image translation and it is utilizing generative adversarial networks (GANs). It includes converting a simple black-and-white drawing into a colour image. This technique helps presenting a garment or an accessory design in online platforms and catalogues as a more real-life version before it has been actually manufactured. It saves a designer team from a lot of hand engineering, which makes the design more accessible to use by a wider audience.[20] However, instead of actual independent designing, image-to-image translation is certainly more of a designer assistant. Hence, it would not be likely to generate original works by itself and raise copyright issues.

2.3. AI as an independent designer

In addition to directing the style of designing and assisting a human designer, it is possible to incorporate AI in the designing process itself and let AI design independently—at least in theory. In 2017, Amazon claimed the ability to train a GAN, a type of generative model, to design garments.[21] The use of GAN as a fashion designer refers to 'a process of taking a dataset of images, and outputting images that are visually similar but generated by the model'.[22] The images that form the input data set could be, for instance, images of garments that

are trending on social media. This type of use of real-time data and GANs for fashion design purposes can help a fashion company to understand a demand for the garments before producing them.[23]

AI can be given the capacity to learn styles from large data sets of content and, by using that content, mimic human designers.[24] AI's deep learning techniques are not limited to copying the styles of pre-existing fashion designers: they can also be used to mix and combine multiple sources, from a variety of styles, and come up with rather original outcomes.[25] Designing garments without any kind of human intervention can be risky though. In 2013, Amazon was selling American clothing company Solid Gold Bomb's algorithm-designed T-shirts that were inspired by the much reproduced 'Keep Calm and Carry On' second world war poster. The T-shirts had prints stating, for instance, 'Keep Calm and Rape a Lot' and 'Keep Calm and Hit Her'. Unsurprisingly, these T-shirts caused outrage towards both Amazon and Solid Gold Bomb, which blamed an automated computer dictionary.[26]

American fashion brand Marchesa provides a more successful example of incorporating AI into fashion designing. In 2016, Marchesa and IBM Watson co-created a dress that 'thinks'. The dress was showcased in the annual Met Gala. The AI program that was being used, IBM Watson, is a cognitive system that understands, reasons and learns. Watson scanned vast volumes of fan social data to enable the dress to change colour in response to social sentiment by using Watson's Tone Analyzer API to analyse fan tweets and showcase them in real time. In other words, the dress understood and responded to its fans by changing its colour.[27] It was able to 'redesign' itself over and over again by analysing data. In theory, the AI application could come up with changing prints and patterns decorating the dress that could (if they were created by a human author) be considered original in copyright terms.

an expensive way of manufacturing. However, the development of 3D-printing might provide a solution to this problem. 3D-printing enables a manufacturer to produce smaller quantities and even unique products without adding too much cost. This is a significant change since during the previous decades, the manufacturing of fashion has been dominated by mass production and basically the only alternative to mass production has been custom-made, made-to-measure clothes and tailored clothes—all of which end up being significantly more expensive options to produce. H Härkönen and M Antikainen, 'Uhkaavatko 3D-tulostetut feikkituotteet muotibrändejä?' [Are 3D-printed Fake Products a Threat to Fashion Brands?] IPRinfo (Helsinki, April 2017) <https://iprinfo.fi/artikkeli/uhkaavatko_3d-tulostetut_feikkituotteet_muotibrandeja/>, last accessed 13 February 2020. See also Black (n 11) 118, 127–29.

20 Luce (n 3) 129.

21 ibid 125.

22 ibid 125–26.

23 ibid.

24 Guadamuz (n 1) 19.

25 J-M Deltorn and F Macrez, 'Authorship in the Age of Machine Learning and Artificial Intelligence' (2018) Center for International Intellectual Property Studies Research Paper Series 2018-10, 5 <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3261329> last accessed 13 February 2020.

26 *The Guardian*, 'Amazon Acts to Halt Sales of "Keep Calm and Rape" T-shirts' (New York, 2 March 2013) <https://www.theguardian.com/technology/2013/mar/02/amazon-withdraws-rape-slogan-shirt> last accessed 19 December 2019.

27 Internet of Things Blog, ' Cognitive Marchesa Dress Lights Up the Night' (27 October 2016) <https://www.ibm.com/blogs/internet-of-things/cognitive-marchesa-dress/> last accessed 31 December 2019; IBM, 'Marchesa and Watson Worked Together to Create A Dress That Thinks' (2 May 2016) <https://www.ibm.com/watson/stories/ca-en/dress.html> last accessed 31 December 2019.

2.4. Conclusion about fashion design and the use of AI

There has been some debate about whether AI will revolutionize fashion designing and, if so, when will that revolution take place. Luce considers the promise of an 'AI fashion designer' more of a hype than anything production ready. Although AI designing is currently a topic that is being explored in the research community and the field is moving quickly, due to the difficulties described above, generative models are not quite ready yet for commercial use. Regardless, they have at least some potential in designing.[28] One should also keep in mind that AI is not actually that intelligent: AI-based programs still do only what operators have told them to do, albeit with fantastic speed and accuracy.[29] After all, machines can only mimic creative works that they are fed.[30] Furthermore, one important human quality that AI lacks is intuition, the ability to leap beyond logic.[31] One could argue that a good fashion designer is able to make use of their intuition in their creative process. Nevertheless, using generative models in fashion designing might appear as an attractive strategy for fashion houses because employing human fashion experts, stylists and fashion designers is cost-intensive.

It indeed seems to be that at least in the current stage of development, AI is used more as a stylist assistant for designers, rather than an independent clothing designer. We cannot, however, ignore AI's potential to create fashion designs without human interference. AI can be a lot more than just a stylist assistant. When it comes to the latest types of AI, the computer program is no longer a tool: it is able to make many of the decisions involved in the creative process without human intervention.[32]

3. Copyright infringement issues related to AI designer

Technological development has always shaped and driven the development of copyright law. When copyright law interacts with technological change, it is actually not the technology itself that is of interest: rather, the focus is in the challenges that the changing technology creates to the copyright system.[33] In this section, the challenges that the development of AI-fashion designing technology presents to copyright law are analysed with a particular focus on copyright infringement. Before delving into these new challenges, the already existing copyright issues that the fashion industry is struggling with are briefly explained in order to get a better picture of the full scope of the problem(s).

3.1. Fashion and copyright: general issues

There are two main problems to consider when it comes to copyright protection of fashion designs. The first is that it is often difficult to determine whether a fashion design is protected by copyright in the first place. The second is that in the world of fashion, where trends tend to dictate styles to a certain extent, it is extremely difficult to draw a line between inspiration and infringement.

The fashion industry is notorious for copying, piracy and knock-offs that are at least partly caused by the fact that the fashion cycle needs at least some kind of imitation in order to function.[34] Also, it must be noted that not all copying is necessarily bad. Certain forms of copying—such as imitation, allusion and quotation—are culturally acceptable.[35] This is also the case in the fashion industry. In fashion, at the same time, different fashion brands have similar-looking (but not necessarily completely similar) apparel and accessories in their collections because they all participate in the same trend.[36]

The difference between inspiration and copying is everything but easy to determine. Being inspired by another designer's work will not typically constitute a copyright infringement per se. However, copying by, for example, duplicating or taking a substantial part of another designer's work may constitute an infringement,[37] provided that the source of copying is an original work of authorship.[38] There can still be infringement without literal copying.[39] Sometimes it might be extremely difficult to distinguish whether a fashion design takes part in the same trend with the

28 Luce (n 3) 131, 137.

29 C Beckwith, 'Op-Ed | Can Artificial Intelligence Ever Understand Fashion?' (*Business of Fashion*, 27 February 2019) <https://www.businessoffashion.com/articles/opinion/op-ed-can-artificial-intelligence-ever-understand-fashion> last accessed 31 December 2019.

30 Luce (n 3) 127.

31 Beckwith (n 29).

32 Guadamuz (n 1) 17.

33 L Wiseman and B Sherman, 'Facilitating Access to Information: Understanding the Role of Technology in Copyright Law' in S Frankel and D Gervais (eds), *The Evolution and Equilibrium of Copyright in the Digital Age* (CUP 2014) 221–22.

34 G Simmel, *Philosophy of Fashion* (Berlin, Pan Verlag 1905).

35 N Groom, 'Unoriginal Genius: Plagiarism and the Construction of "Romantic" Authorship' in L Bently, J Davis and JC Ginsburg (eds), *Copyright and Piracy: An Interdisciplinary Critique* (CUP 2010) 271, 273. See also A Drassinower, *What's Wrong with Copying?* (Harvard UP 2015) 2: the wrongfulness of copying is a socio-historical construct.

36 Sprigman (n 6) 256.

37 Although an exception or limitation might apply.

38 Härkönen (n 5) 919, 920.

39 A Durant, '"Substantial Similarity of Expression" in Copyright Infringement Actions: A Linguistic Perspective' in Bently, Davis and Ginsburg (n 35) 147.

source of inspiration, or is a copy of the source of inspiration and, hence, infringes the copyright of its author. The whole distinction between participating in a trend and copying another fashion design is related to the idea versus expression dichotomy of copyright law.[40] This borderline is everything but easy to determine, and according to some opinions, 'nobody has ever been able to fix that boundary and nobody ever can'.[41]

What makes it rather easy for fashion companies to copy each other is that fashion items often fall outside of the scope of copyright.[42] This is due to the fact that, historically, the originality threshold for works of applied art has been rather high.[43] Nevertheless, the situation in Europe seems to be changing due to the recent judgment of the Court of Justice of the EU in *Cofemel*,[44] which noted that the standard of originality[45] is the same for both pure arts and applied arts, and Member States are not allowed to set different criteria for different types of works.[46] However, when it comes to garments and accessories, their functionality plays a role in copyright protection. When the designing process of any type of work is dictated by the technical function of the work, the criterion of originality is not met.[47] Because the function of a garment dictates the designing of it at least to some extent, it is quite difficult for a fashion design to be original in the sense that copyright law requires.[48]

To conclude, the fashion industry faces significant copyright challenges already, without any interference from AI. The key challenge is related to fashion designs passing the originality threshold and, hence, qualifying as copyright-protected works which, in many cases, reduces the legal risks of copying fashion designs. Lack

of protection has helped especially fast fashion companies to knock off popular designs of high-end and indie designers.[49] Thus, when AI meets fashion designing, we are not only dealing with the already existing copyright issues that the industry faces but also with the copyright questions that AI brings along.

3.2. Fashion, copying and AI: specific copyright issues

Before we consider the questions concerning potential copyright infringement issues of AI-generated works, two other questions need to be addressed. The first one concerns originality and the second relates to authorship. If a work is not original, the question of authorship is irrelevant, nor can there be any copyright infringement. Since this article focuses on infringement, the issues of originality and authorship are described very briefly. The issues regarding originality and authorship of AI-generated works have been previously considered quite extensively by other scholars.[50]

What often makes it difficult for fashion designs to be protected by copyright is that they often lack originality,[51] and work cannot be protected by copyright unless it is original.[52] In the EU, originality is an autonomous concept that requires uniform interpretation. It is considered to mean 'author's own intellectual creation' and that the author has 'stamped the work with their personal touch'.[53] The standard of originality applies to all categories of works, even the ones of applied art, such as fashion designs.[54] The EU approach to originality highlights the personhood of the author.[55]

40   ibid 147–49; G Dinwoodie, 'Refining Notions of Idea and Expression Through Linguistic Analysis' in Bently, Davis and Ginsburg (n 35) 194.

41   Durant (n 39) 150, 151; Dinwoodie, ibid 202.

42   Noto La Diega (n 9); Härkönen (n 5) 909, 910 and 918–20.

43   E Derclaye, 'A Model Copyright/Design Interface' in E Derclaye (eds), *The Copyright/Design Interface* (CUP 2018) 441.

44   Case C-683/17 *Cofemel – Sociedade de Vestuário, SA v G-Star Raw CV* (2019) ECLI:EU:C:2019:721.

45   'Author's own intellectual creation', as employed in CJEU judgment in Case C-5/08 *Infopaq International A/S v Danske Dagblades Forening* (2009) ECLI:EU:C:2009:465.

46   *Cofemel* (n 44) para 29–35. See also E Rosati, 'The Cofemel Decision Well Beyond the "Simple" Issue of Designs and Copyright" (IPKat, 17 September 2019) <http://ipkitten.blogspot.com/2019/09/the-cofemel-decision-well-beyond-simple.html> last accessed 15 January 2020.

47   Case C-393/09 *Bezpečnostní softwarové asociace – Svaz softwarové ochrany v Ministerstvo kultury* (2018) ECLI:EU:C:2010:816, para 49.

48   Härkönen (n 5) 910, 918–21.

49   Noto La Diega (n 9) 18, 22–23; Sprigman (n 6) 256; Raustiala and Sprigman (n 4) 1705–17.

50   On originality see, eg Alén-Savikko, Ballardini and Pihlajarinne (n 2); M Antikainen, 'Copyright Protection and AI-Generated Works – A Fight We Have Already Lost?' in Luigi Carlo Ubertazzi (ed), *AIDA: Annali italiani del diritto d'autore, della cultura e dello spettacolo XXVII 2018*

(Giuffrè Francis Lefebvre Milan 2018) 243. On authorship see, eg A Bridy, 'The Evolution of Authorship: Work Made by Code' (2016) 39 Columbia Journal of Law & the Arts 395; J Grimmelmann, 'There's No Such Thing as a Computer-authored Work – And It's a Good Thing, Too' (2016) 39 Columbia Journal of Law & The Arts 403; Kaminski (n 2); J Ginsburg, 'People Not Machines: Authorship and What It Means in the Berne Convention' (2018) 49 IIC 131.

51   Härkönen (n 5) 909, 910 and 918-20.

52   *Infopaq International A/S* (n 45) para 33–37. See also: D Jongsma, *Creating EU Copyright Law: Striking a Fair Balance* (Hanken School of Economics 2019) 25, 33; E Rosati, *Originality in EU Copyright* (EE Cheltenham 2013) 3, 107–09; E Rosati, *Copyright and the Court of Justice of the European Union* (OUP 2019) 88–91.

53   *Infopaq International A/S* (n 45) para 37; Case C-145/10, *Eva-Maria Painer v Standard VerlagsGmbH et al* ECLI:EU:C:2011:798, para 92; Directive 2009/24/EC of the European Parliament and of the Council of 23 April 2009 on the legal protection of computer programs article 1(3); Council Directive 93/98/EEC of 29 October 1993 harmonizing the term of protection of copyright and certain related rights article 6 and Directive 96/9/EC of the European Parliament and of the Council of 11 March 1996 on the legal protection of databases article 3.

54   Alén-Savikko, Ballardini and Pihlajarinne (n 2) 981. See also *Cofemel* (n 44).

55   See, eg, *Eva-Maria Painer* (n 53) paras 88, 89 and 92.

Originality has consistently been interpreted in a way that it requires the author to be human, reflecting the civil law countries' natural law justification for copyright protection.[56] In civil law countries, the purpose of copyright is to protect the creativity of a natural person and provide them incentives to create. AI does not have a 'personhood', nor does it need incentives to create. The Berne Convention does not define authorship, nor does it require the author to be human. However, the member countries of Berne seem to agree that the author needs to be human.[57] This applies even in cases of 'arguably borderline authorship' such as applied art, as described by Ginsburg.[58] In other words, within the scope of Berne, it is not possible for an AI fashion designer to be considered as an author, which means that an AI-generated fashion design cannot be considered original if AI was its sole creator.[59] There could presumably be cases where one would be able to find sufficient human input from an AI-generated work and, hence, a human author behind the AI. If a human was guiding an AI designer by giving commands regarding, for example, what kind of garments to design, which colours to use and which materials to pick, it would be possible to consider this human as the author of the AI-generated design.[60] However, purely AI-generated fashion designs would likely fall outside of copyright protection by default, making them free for everyone to copy (unless they fulfil the requirements of design protection or some other form of IP protection). This would be the kind of copyright law approach that some scholars (notably, Raustiala and Sprigman) find ideal for fashion designs because they consider that fashion designs should be placed outside of the copyright regime *tout court*.[61]

Another factor to be concerned about is whether an AI designer would happen to infringe another designer's exclusive rights.[62] As explained in Section 2, AI's ability to 'create' fashion designs is mostly based on mimicking pre-existing fashion designs with the help of GANs. In other words, the creativity of GANs is based

on borrowing elements from already existing designs by other creators. This configuration sounds like it is asking for copyright infringement lawsuits, but is it really? Here we once again run into the problem of originality in fashion designs.[63] It is a notorious fact that fashion designs face problems with reaching the originality threshold already before the interference of AI designing. One could perhaps state that most fashion designs are unable to meet the criterion of originality. Thus, if an AI designer made use of the massive amount of data it has been fed and come up with a fashion design that is very similar to another designer's work, that would not necessarily constitute a copyright infringement, provided that the source data comprised of fashion designs that do not pass the originality threshold (which most fashion designs arguably do not pass). It seems that, in most cases, the situation would probably not differ a lot from a case where a human designer would create a mood board in order to get inspiration for their upcoming collection and, hence, create a design that would bear resemblance to an earlier third-party work.

However, there are admittedly fashion designs that do pass the originality threshold.[64] Thus, we cannot completely ignore the possibility of AI using original fashion designs as its source data. Would the use of original fashion designs as AI designer's source data constitute a copyright infringement? Not necessarily. The DSM Directive[65] (Article 4) provides a copyright exception that might create a new room for this kind of lawful use of copyright-protected material in Europe.[66] The directive includes mandatory exceptions regarding text and data mining. Article 4 allows acts of reproduction and extraction for the purposes of text and data mining. Furthermore, reproductions and extractions may be retained for the same purpose. The article also applies to data mining purposes that have a commercial motive. This is relevant from the perspective of AI designers, since in the process of their analysis, they will invariably reproduce copyright protected fashion

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56 Bridy (n 50) 401. See also J Ginsburg, 'A Tale of Two Copyrights: Literary Property in Revolutionary France and America' (1990) 64(5) Tulane Law Review 991.

57 Ginsburg (n 50) 131; Bridy (n 50) 399.

58 Ginsburg, ibid 134.

59 A whole another question is, should AI be considered as an author, or who would be considered as the author of an AI-generated work—the programmer or the user of AI, for instance? See, for example, Kaminski's analysis on this issue: Kaminski (n 2) 596–616.

60 It must be noted that some countries have already adopted this approach in their legislation. For example, in the UK, the Copyright, Designs and Patents Act (1988), s 9(3) states that 'In the case of a literary, dramatic, musical or artistic work which is computer-generated, the author shall be taken to be the person by whom the arrangements necessary for the creation of the work are undertaken.' Of course, drawing the line between

human/machine authorship would not necessarily be easy. We would probably need to define a boundary where there can still be considered to be sufficient human input.

61 K Raustiala and C Sprigman, *The Knockoff Economy. How Imitation Sparks Innovation* (OUP 2012) 21; Sprigman (n 6) 251–58.

62 See also Üstünkaya (n 10) 17.

63 ibid 16.

64 Härkönen (n 5) 918–21.

65 Directive (EU) 2019/790 (n 14).

66 About DSM directive, data mining and AI: see E Rosati, 'Copyright as an Obstacle or an Enabler? A European Perspective on Text and Data Mining and its Role in the Development of AI Creativity' (2020) Asia Pacific Law Review (in course of publication).

designs. After implementation of this exception in the DSM Directive, these reproductions could be exempted from infringement. However, it shall be noted that Article 4 allows right holders to opt out of the exemption. The provision only applies upon condition that right holders have not expressly reserved their rights 'in an appropriate manner, such as machine-readable means in the case of content made publicly available online'.[67] The term 'appropriate manner' is not clearly defined, so fashion houses who wish to opt out of the data mining exemption would then need to decide how opting out would take place in practice.

Furthermore, if the data set of images used by GAN—AI's 'source of inspiration'—consists of the kind of fashion designs that can be considered original, the resulting work should be modified enough from the data in order to avoid infringement claims. It should be altered to the point that it is no longer substantially similar to the source of inspiration in order to eventually get to the point where (in a case of a human creator) the creator of the latter work could be considered an author that has independent copyright to their sole-authored work.[68] In other words, the evaluation process would be exactly the same as it would be in a case of two human authors. However, if the AI designer only makes *de minimis* modifications to the source of inspiration, AI designer will be an infringer, not an author-like subject.[69] Also, even if AI makes large modifications, it may reproduce elements which constitute the author's own intellectual creation. It is not impossible either to create something original and be an infringer at the same time. Hence, it requires quite developed GANs to come up with original fashion designs that are less likely to be considered infringing.

What also might be different depending on whether an infringer was a human or a machine designer, is the question of liability for the infringement. Unlike a human designer, an AI designer could not be held liable for a copyright infringement if it copied another designer's work in its creative process—provided that the copied creation had a human author in the first place. It would be the person behind the AI—whether legal or natural—who would be responsible for any infringements.[70] In a situation where an AI designer would copy another AI-generated fashion design, no copyright problem would be likely to arise due to the lack of human authorship and the lack of originality that follows thereof.

An important aspect to consider is whether AI designers could change the market for fashion designs.[71] At least in the current copyright environment, works produced by AI designers would end up in the fashion industry's public domain even more easily than the creations of their human colleagues. This, on the other hand, is something that we perhaps should try and avoid, especially for sustainability-related reasons. According to recent surveys, it has become clear that way too much clothing is being produced and consumers dispose their clothes much too soon after they buying them, in order to make room for new purchases.[72] To make matters even worse, new unsold garments are often simply burned instead of being recycled, donated or treated in any other more sustainable manner. It is clear that fashion suffers from overproduction and overconsumption. Henceforth, it is worth considering, how will the increasing use of AI designer affect the world of manufacturing, and how does that further affect the copyright system. AI designer might work faster and more effectively than a human designer, yet a large amount of 'creativity' of it is based on mimicking already existing designs. In theory, this could lead to an increasing amount of copies in the industry which is already struggling with a large amount of knock-offs. It has been argued that copying is actually the engine that keeps the fashion industry going and makes it work at a faster pace, creating more and more fashion consumption.[73] The danger is that the use of AI designers might end up filling the public domain of the industry and, hence, boost the cheap knock-off activity (that especially fast fashion companies tend to do). Making manufacturing of knock-off fashion easier by the increase of copyright-free space in fashion designing might give incentives for fast fashion companies to produce even more knock-offs because the risk of being sued for copyright infringements decreases. Furthermore, letting AI-generated innovations fall automatically into the public domain might also have a chilling effect on investments in AI systems.[74] There are

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67 Directive (EU) 2019/790 (n 14) art 4. See also B Hugenholtz, 'The New Copyright Directive: Text and Data Mining (Articles 3 and 4)' (*Kluwer Copyright Blog*, 24 July 2019) <http://copyrightblog.kluweriplaw.com/2019/07/24/the-new-copyright-directive-text-and-data-mining-articles-3-and-4/> last accessed 16 January 2020.

68 Grimmelmann (n 50) 410, 411.

69 ibid 410. About *exact copies* and *inexact copies*, see also A Barron, 'Copyright Infringement, "free Riding" and the Lifeworld' in Bently, Davis and Ginsburg (n 35) 93, 105.

70 More about AI's liability: V Kurki, 'Voiko tekoäly olla oikeussubjekti?' [Can an Artificial Intelligence Be a Legal Person?] (2018) 116 Lakimies 820.

71 See also Üstünkaya (n 10) 15.

72 Ellen MacArthur Foundation (n 8); McKinsey & Company (n 8).

73 Sprigman (n 6) 256; Raustiala and Sprigman (n 4) 1722, 1724, 1728–29 and 1733.

74 Guadamuz (n 1) 17.

little incentives for fashion houses to invest in AI-based designing, if it would mean that the results of that designing would automatically be free for their rivals to copy.

4. How should copyright law deal with this?

Multiple legal scholars have already taken their stand in the discussion of copyright protection of AI-generated works and stated their views about how copyright should treat these creations. In this section, the most suitable suggestions are being presented, and their relevance from the fashion industry's perspective is analysed. Furthermore, the potential sustainability effects of copyright protection of AI-generated fashion designs are discussed.

Denicola argues that if a user's interaction with a computer prompts it to generate its own expression and the result is excluded from copyright, this is a tenuous, ultimately unnecessary and counter-productive distinction. Furthermore, it 'denies the incentive of copyright to an increasingly large group of works that are indistinguishable in substance and public value from works created by human beings'.[75] Denicola furthermore suggests that a computer user who initiates the creation of an AI-generated work should be recognized as the author and copyright owner of the resulting work.[76] Denicola's approach to the topic makes sense. This way, AI-generated works would not automatically end up in the public domain due to the lack of human authorship (and hence, originality). Another interesting solution to the problem is the one considered by Alén-Savikko, Ballardini and Pihlajarinne. They consider that in the future, copyright protection might develop into a 'dual system', which would be divided into 'romantic' protection of human-created original works and 'industrial' protection of investments and development of machine creation.[77]

Recognizing AI creativity in the eyes of copyright law would be a suitable solution for fashion houses that actually do create designs themselves—with or without the help of AI. It would not serve the business strategy of the kind of fashion operators that just rely on copying successful designs of others, which is what many fast fashion companies tend to do. If the copyright system considered AI creativity worth protecting, the system could also provide incentives to develop and utilize AI designers, in addition to promoting creativity instead of imitation.[78]

When it comes to the development of AI creativity, in addition to recognizing detailed copyright issues such as authorship, originality and infringement, it is important to see the big picture: how will AI change the market for copyright content due to low-cost mass production of works that look and function like human-created works. In the special case of the fashion industry, the bigger picture includes the problem of overproduction that flourishes in the low-IP environment, which leads to overconsumption and an environmentally damaging outcome. Legal scholars have indeed pointed out that more fashion goods are consumed in a low-IP environment compared to how much would be consumed in a world of high-IP protection. The reason for this is that copying rapidly reduces the premium status conveyed by new apparel and accessory designs, leading status seekers to renew the hunt for the next new thing over and over again.[79] However, since it is clear that the fashion industry is struggling with major sustainability challenges due to overproduction and overconsumption, a situation where more and more fashion goods are being consumed should not be seen as an ideal outcome. Hence, copyright law should not encourage businesses into this kind of activity by leaving AI-generated fashion designs out of the scope of protection, and thus making them an easy target for (fast fashion) copycats.

All this said, it would not be realistic to assume that fixing the copyright problem(s) that the fashion industry is struggling with would also automatically fix the sustainability problem in its entirety. From the sustainability perspective, the effectivity of copyright protection of AI-generated fashion designs would also greatly depend on whether right holders were actually willing to enforce their rights against infringers or not. If right holders of influential AI-generated designs choose to tolerate copies of their designs even if they had the legal measures to fight them, copyright protection has very

75 R Denicola, 'Ex Machina: Copyright Protection for Computer Generated Works' (2016) 69 Rutgers University Law Review 251, 286.

76 ibid, 286, 287. Also Bridy suggests that AI-generated works should be recognized in the eyes of copyright law and to be treated in a similar way as works made for hire, which is a US-specific concept (Bridy (n 50) 400, 401). Denicola's and Bridy's suggestions differ in the sense of who should be considered as the author. When analysed in the context of the fashion industry, Denicola's model would grant authorship to the designer that is using AI, and Bridy's model would give the copyright to the fashion house. In the end, choosing between these models would be about

choosing to protect either a natural person or a company, and different jurisdictions surely have different emphasis regarding the topic. In that sense, Denicola's approach seems to fit the European copyright environment better since it has a more natural law than a utilitarian approach to the topic.

77 Alén-Savikko, Ballardini and Pihlajarinne (n 2) 993.

78 See also Guadamuz (n 1) 17.

79 Raustiala and Sprigman (n 4) 1206–07.

little effect. Also, what cannot be ignored when evaluating the effectivity is that enforcing IP rights is not cheap; especially for a smaller fashion business, the threshold of taking legal actions against an infringer might be high. Due to the aforementioned reasons, even in the event that AI-generated fashion designs were protected by copyright, it would not make all kinds of knock-offs disappear. However, copyright law might help pushing the fashion industry towards more sustainable business models by sending a signal that AI-generated fashion designs are not automatically free for everyone to copy. In order to fix the sustainability issues of the fashion industry, a combination of various legal measures is needed. For example, taxation and environmental law solutions play an important role in this matter. Copyright law and how it treats AI-generated fashion designs are just one part of the many legal measures that ought to be taken in order to secure the sustainable development of the fashion industry.

To conclude, even though an AI designer does not need incentives to create in a similar way as human authors do, denying copyright protection from AI-generated fashion designs would be the worst possible solution to the problem, especially due to sustainability reasons. We should not create circumstances where new fashion designs would fall into the public domain even more easily than they do now. The fashion industry cannot be encouraged to function in an even more unsustainable way than it functions right now.[80]

5. Conclusion

It seems that, fundamentally, the copyright infringement problems that will arise by the increasing use of AI in fashion designing are actually not that different than the already existing problems in the special context of the fashion industry, but they do add a little twist to the cocktail. The fundamentals of these issues are the same: they are all related to the difficulties that fashion designs have when it comes to reaching the originality threshold. As Grimmelmann points out, AI authorship is a special case to a more general problem: it presents a few new twists on familiar issues.[81] AI indeed seems to add some more concerns to the already existing problems that are caused by fashion's nature as applied art, but essentially, the underlying questions are the same. However, AI might affect the scale in which these copyright problems show in the real world and make some of them more remarkable than before. In the current copyright environment, it seems that AI-generated fashion designs would be more vulnerable for copyists than human-created designs.

Finally, it is worth considering, what kind of effects would AI have in the economic fashion market of human-authored fashion designs. When it comes to the future of fashion, are we moving towards a situation where a human-designed garment is the new luxury?

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80 About the unsustainability, see, eg Ellen MacArthur Foundation (n 8); McKinsey & Company (n 8).

81 Grimmelmann (n 50) 415.