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RESEARCH ARTICLE

EU rules of origin, signalling and the potential erosion of the art market through generative artificial intelligence

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Abstract

Generative artificial intelligence (GenAI) systems generate artwork likely to be copyrightable if made by human. In lieu of discussing whether machine-enabled artworks should be copyrighted, a question that has received a large attention in academic scholarship, this paper proposes to analyse the economic implications of GenAI. Although the valuation of their outputs is still mostly unknown, preliminary studies show that, all other things being equal, humans' works are evaluated at a significant higher value than machine-enabled ones. Yet, to be properly valued, human-made and machine-enabled products must be distinguishable. They are not. This indistinguishability creates an asymmetry in information that in turn leads to a lemons problem, defined as a market erosion of good-quality products. Against that background, this paper proposes a solution in light of European Union rules of origin and the so-called substantial transformation test. This solution can then be used in copyright law to identify where the human author has been able to make free and creative choices (or lack thereof) required to satisfy the criterion of originality and, hence, copyrightability.

Keywords: generative artificial intelligence; asymmetrical information; lemons problem; rules of origin; signalling

1. Introduction

March 1884. The Supreme Court of the United States held in *Burrow-Giles* that a portrait photograph is copyrightable.[1] The Court explained that even if photography is by definition a mechanical process that takes a snapshot of reality, the author can still exercise a control during the creative process.

December 2011. The European Court of Justice (hereafter, ECJ) reached the same conclusion in *Painer*. A portrait photograph is protected by copyright if the photographer was able to make "free and creative choices" during its production.[2]

February 2023. The US Copyright Office (hereafter, USCO) held that the images contained within Kristina Kashtanova's comic book *Zarya of the Dawn* and drawn by a generative artificial intelligence (hereafter, GenAI) were not copyrightable.[3] Referring to *Burrow-Giles*, the Office concluded that the user of a GenAI lacks "sufficient control over the generated images."[4]

[1]*Burrow-Giles Lithographic Co. v. Sarony* [1884] 111 US 53, 60.
[2]Case C-145/10, *Eva-Maria Painer v Standard Verlag GmbH and others*, ECLI:EU:C:2011:798, §94.
[3]United States Copyright Office, 'Zarya of the Dawn (Registration # VAu001480196)', 21 February 2023, https://copyright.gov/docs/zarya-of-the-dawn.pdf.
[4]Ibid, 9.

April 2023. German photographer Boris Eldagsen declined the award for the Creative Open Competition Category of the 2023 Sony World Photography Award after having revealed it was an AI creation (Novak, 2023). He explained that he willingly misled the jury in order to publicly engage in an open discussion on the future of photography.

What can be learnt from that background? First, *Burrow-Giles* and *Painer* teach that the use of a machine in the creation of a work does not prevent it from being copyrighted as long as the human user is able to exercise a certain creative control over the creation. Second, the USCO decision related to *Zarya of the Dawn* suggests that users of GenAI do not reach the required threshold. Third, the declined photography award hints that human-made and machine-enabled artworks are indistinguishable.[5] This indistinguishability implies asymmetric information, namely, artists do know whether the artwork is machine-enabled or human-made while beholders do not. George Akerlof (1970) seminally described asymmetric information as a lemons problem. When buyers (beholders) are unable to distinguish good- (known as peaches) from poor-quality (known as lemons) products (artworks), they assess quality on average. If sellers have an incentive to cheat, buyers internalise the risk of buying a poor-quality product at the price of a good-quality one. Therefore, sale price of peaches is systemically lower than their value while sale price of lemons is higher than what they are worth. Consequently, sellers of peaches withdraw from the market. This further erodes the average quality of available product and, eventually, the market collapses.

The art market constitutes a fertile ground for the lemons problem, a fortiori with the advent of GenAI: since copyrightable human-made artworks and uncopyrightable machine-enabled ones are indistinguishable, sellers of the latter are incentivized not to disclose whether an AI was involved in the creation process (De Cooman, 2023). This has economic consequences given that copyright is an exclusive property right that grants its owner a temporary monopoly (Pila & Torremans, 2019). Assuming therefore that the market value of a machine-enabled artwork (disclosed as such) is lower than the market value of a human-made one, art market buyers will internalize the average risk of being sold a machine-enabled artwork the price of a human-made one. This, in turn, suggests that human-made artists cannot receive the true value associated to their artistic production.

This paper argues that asymmetric information allows dishonestly sold machine-enabled product to drive human-made product out of the market. In other (economic) words, there seems to be no competition *on the merits* between machine-enabled and human-made artworks. Competition on the merits means that "firms must compete through the intrinsic qualities of their products rather than through extraneous conditions" (Gerla, 1984). The ECJ has confirmed that "competition on the merits may, by definition, *lead to the departure from the market* or the marginalisation of competitors that are less efficient and so less attractive to consumers from the point of view of, among other things, price, choice, quality or innovation."[6] In other words, competition on the merits leads the more efficient products to prevail while others vanish. The lemons problem disrupts competition on the merits: machine-enabled artworks will only prevail because of asymmetric information (extraneous condition) and not due to its intrinsic qualities.

This is, however, not inevitable. This paper argues that a rule of origin inspired by art authentication and EU customs and tax law is a way of ensuring that both human-made and machine-enabled artworks hold their own place and keep separate on the art market. To build the argument, this article proposes a fivefold structure. Section 1 sets the scene by defining the lemons problem and transposing it on the art market. Section 2 suggests the lemons problem is an appropriate framework to evaluate the economic consequences of GenAI on that market. Section 3 recommends adopting a rule of origins to erase asymmetric information and suggests workable enforcement solutions.

[5]This article endorses the terminology suggested by Ginsburg and Budiardjo (2020) who explained that it is more relevant to use "enabled" rather than "generated" to emphasise that a machine does not produce the output of its own volition but that it is a human who creates the output with the assistance of a machine.

[6]Case C-413/14 P, *Intel v Commission*, ECLI:EU:C:2017:632, §134. See Nicolas Petit, 'The Judgement of the EU Court of Justice in Intel and the Rule of Reason in Abuse of Dominance Cases' (2018) 43(5) *European Law Review* 728-750.

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Section 4 summarises the argument and concludes that the proposed solution is not a Luddite, but a proportionate response to the (potential) economic consequences of AI on the art market.

2. The lemons problem on the art market

Imagine that on the market for used cars there are only two different types of products: the good-quality used cars – in American slang, the peaches – and the bad-quality ones – the lemons (Akerlof, 1970). Being on the market of used cars, sellers know whether the car being sold is a lemon or not. Buyers do not (Levin, 2001). This asymmetric information incentivises dishonest sellers to sell a lemon at the price of a peach (Wilson, 1989). Buyers, in turn, will value a particular car based on the average probability that that car is a peach (assuming they are risk neutral) and adapt their willingness-to-pay accordingly. Therefore, the market price equilibrium will systematically be lower than what a peach is worth, but higher than what a lemon is worth.

This is a market inefficiency par excellence: asymmetric information forces buyers to misallocate their resources, resulting in a systemic inefficiency that harms both buyers' and other sellers' welfare (Wilson, 1989). Under these conditions, the rational behaviour of sellers of peaches is either to left the market or to voluntarily decrease the quality of their products (Hirschleifer, 1973). Perhaps more critical, the more sellers of peaches leave the market, the greater the probability of selling a lemon at the price of a peach and, therefore, the lower the market price equilibrium. This leads the sellers of moderate-quality products to leave the market, hence further increasing the risk of dishonest deals and decreasing the market price equilibrium accordingly, until the market collapses (Akerlof, 1970). The ever-decreasing product quality and price suggests that, ultimately, the only market equilibrium price is null and, therefore, that no transaction occurs anymore (Wilson, 1989).

Leaving aside the market for used cars, the lemons problem (if slightly adjusted) is also of interest for artworks. Identifying peaches and lemons among artworks is a tricky exercise. Art is the example par excellence of a market where quality is multidimensional, unquantifiable and irreducibly subjective (Hirschleifer, 1973). This explains why some people are willing to pay an astronomical price "for what appears to be a watercolour sketch [that] was likely painted by Jackson Pollock [while] many more aesthetically pleasing works have sold for significantly less" (Day, 2014).

For the sake of this article, a line has to be drawn between *aesthetic value* and *market value* (Budd, 2018). This is not alien to the market for artworks: price reacts negatively when a work is discovered to be a fake or a forgery (Bocart & Oosterlinck, 2011; Keats, 2012). Leonardo da Vinci's *Salvator Mundi* is the most striking examples – although there are others (EmBree & Scott, 2015). In the 1950s, it was sold as a copy of the original, completed by one of da Vinci's students for approximately USD 60 (approximately USD 755 today).[7] After its authentication as a genuine Da Vinci, it was auctioned for USD 450.3 million in 2017 (approximately USD 557.3 million today). However, experts expressed doubts afterwards and the painting has not been exhibited since (Dixon & Shufro, 2021). Authentication did not change the aesthetic value of Salvator Mundi, but did multiply its market value by more than seven hundred thousand – before disappearing from the museum's walls.[8] It is simply a fact that, once discovered, forgeries become monstruous doppelgängers. Yet, this devaluation does not suggest the aesthetic value has decreased: only the market did (Meiland, 2018). Therefore, if (a) a particular artwork shows no artistic difference before and after authentication and if (b) authentication has a tremendous impact on monetary value, then aesthetic value cannot be the prime factor in determining market value (Jaworski, 2013). There exist other factors that give the artwork its "aura" (Benjamin, 1969). The historical value (the story of the work, including the identity of its previous owners), the survival value (how old the artwork is), the contextual value (the beliefs, mindset and social framework of the individuals and culture from which the artwork originated), and the symbolic

[7] All 2023 amount were computed using https://www.officialdata.org/.

[8] Similarly, EmBree and Scott (2015) explained that when the Musée du Louvre discovered that the *Tiara of Saïtapharnès* was a forgery, it chose to hide it from the public for almost a century.

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Table 1. The lemons problem in the markets for (1) used car and (2) artworks

	Market for used cars	Market for artworks
Criterion	Worth of a used car ↦ quality of that car	Worth of an artwork ↦ origin of that artwork
Lemons	Cars that often need repairs	Fakes and forgeries notwithstanding their aesthetic value
Peaches	Reliable cars	Genuine artworks notwithstanding their aesthetic value

value driven from "a famous artist's name and the artist's association with the concept of 'the great genius'" (Wolz & Carbon, 2014) are the elements most often mentioned by art experts to explain what gives an artwork its value in the eyes of beholders (Budd, 2018; Meiland, 2018; Skolnik, 1983). All this suggests that it is the *origin* of the work, i.e., the "when," "how long," "why" and "by whom" questions, that gives the artwork its market value (Day, 2014). In short, aesthetic value is not the prime factor of market value (Jaworski, 2013). Authentication is (Dixon & Shufro). This makes sense, given that the main reason to acquire an artwork today is its resale potential: authentication ensures a proper return on investment (Amineddoleh, 2015; Bonner, 2017).

For this exact reason, this paper argues the art market faces an idiosyncratic lemons problem: on that market, poor-quality products are not necessarily those with low aesthetic value but those with little-valued origin (if valued at all), namely, fakes or forgeries. Corollary, genuine artworks are peaches merely because they are authentic (see Table 1).

To sum up the argument so far, it is impossible for the buyer to know whether she acquires an original artwork or a forgery without authentication (Day, 2014).[9] On the contrary, the seller possesses this knowledge – assuming she is the forger or knows from the forger that the artwork is forged (Crystal-Kirk, 1986). This is asymmetric information. Therefore, buyers will revise their willingness-to-pay to take into account the average probability the artwork is a forgery. Yet, the art market has not collapsed: consumers continue to buy art en masse while "most dealer and patrons adamantly defend the traditional ways in which they have sold and traded art" (Day, 2014). The fact that art is an investment explains why neither buyers nor sellers have asked for more market transparency. Their interests are aligned: buyers do not want symmetric information because they know one day they will be in the sellers' shoes (Day, 2014). This does not change the fact that information asymmetry "has created substantial societal harms" (Day, 2014). Preventing their occurrence is precisely the raison d'être of authentication (Bonner, 2017).

3. GenAI and the market for lemons

For a lemons problem to exist, good- and poor-quality products must have a different value and be indistinguishable, so that there is an incentive to sell a lemon for the price of a peach. This section discusses whether GenAI is concerned by information asymmetry and incentive to cheat.

3.1 Indistinguishability

Machine-enabled artworks and human-made ones are indistinguishable. Anyone willing to buy an artwork would be incapable of identifying its human or machine origin by simply looking at it (Aboutalebi et al., 2023). This is easily explained technologically. May it suffice to analyse the functioning of a diffusion model to be convinced. In a nutshell, a diffusion model uses tokenised training data "to discern statistical correlations – often at staggeringly large scales – among features of the content on which the model is being trained" (Samuleson, 2023). Then, the model generates outputs that

[9]This indistinguishability is reinforced by the fact that (a) the primary art market is relatively small while the secondary (resale) market is much larger and (b) that art galleries conduct their business privately and confidentially – which reduces price transparency.

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are new but whose distribution is similar to the original dataset (Yang et al., 2023). To do so, the training of a diffusion model is twofold: during the forward process, Gaussian noise is added to training data and then, during the reverse process, the model learns by removing that noise to recover the data (Ho et al., 2020). Once trained, a diffusion model generates new data by taking randomly sampled noise and refining it through the learned denoising process (Bengesi et al., 2024; Gozalo-Brizuela & Garrido-Merchan, 2023). Eventually, a diffusion model generates "contents that are indistinguishable from those taken from nature" (Nie et al., 2023). More exactly, the most advanced of these models are able to generate "forgeries [that] are classified as genuine by advanced forensic classifiers and [that] are difficult for humans to distinguish" (Zhou et al., 2024). Indistinguishability in the context of the art market cannot be better defined.

That said, it cannot be stressed enough that the indistinguishability between a human-made and machine-enabled artwork does not mean the latter is *ipso facto* a fake or a forgery. It is not a fake because it is possible to use GenAI to produce an artwork that is not in the style of a human artist (Clifford, 1997). Mentioned above, Kristina Kashtanova's comic book is indubitably a genuine machine-enabled artwork. Similarly, a machine-enabled artwork is not a forgery either. The case of the partnership between ING, Microsoft, TU Delft, Mauritshuis and Rembrandthuis drives the point home. Together, they produced a new painting *in the style of* Rembrandt using a deep learning facial recognition algorithm Ih first Identified and then replicated Rembrandt's patterns. Although the result (*The Next Rembrandt*) is indistinguishable from a genuine piece of the Dutch great master, it was never disclosed as such.[10] *The Next Rembrandt* is therefore not a forgery (a work In the style of an artist and Identified as genuine) but a fake (a work in the style of an artist but not identified as genuine).

3.2 Incentive to cheat

Does GenAI human user has an incentive to sell a machine-enabled artwork as a human-made one? It seems it is the case. On the one hand, they are indistinguishable. Anyone willing to buy an artwork would be incapable of identifying its human or machine origin by simply looking at it (Aboutalebi et al., 2023). On the other hand, their market value under symmetric information might well be different. Although the valuation of machine-enabled artwork is still *terra incognita*, several elements suggest that human-made artworks will be the peaches and machine-enabled ones the lemons.

First, the question whether the origin of an artwork (either human-made or machine-enabled) influences its perceived beauty, novelty and meaning has been experimentally investigated (Ragot et al., 2020). The study discovered a "negative bias of perception towards [machine enabled artworks] and a preference bias towards [human-made ones]" (Ragot et al., 2020).[11] Given (a) that the value of an artwork is not a function of its aesthetic merits but rather of its aura, which, as suggested above, comprises historical, survival, contextual and symbolic values and (b) that beholders seem to hold a prejudice against GenAI's outputs, it is reasonable to assume that machine-enabled artworks will be valued less than their human-made counterparts.

Second, auctions of machine-enabled artwork at prices that exceed expert evaluation seem to be drying up. It is true the *Portrait of Edmond de Belamy* (created by the French collective Obvious) skyrocketed during its sale at Christie's – as its hammer price (including fees) was more than 43 times its high estimate (Cohn, 2018). However, this oft-cited auction should not hide that it was a world premiere. Subsequent auctions were less sensational. Mario Flingemann's *Memories of Passerby I* was auctioned at a hammer price equal to its upper estimate (excluding fees).[12] Shortly after, Obvious' *La Baronne de Belamy* was auctioned at a price higher than the lower estimates but lower than the upper

[10] See https://www.nextrembrandt.com/.

[11] Terminology corrected for consistency.

[12] 'Memories of Passerby I', Lot 109 (2018) https://www.sothebys.com/en/auctions/ecatalogue/2019/contemporary-art-day-auction-l19021/lot.109.html.

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Table 2. GenAI output auction trend

Artwork	Lower estimate (USD)		Upper estimate (USD)		Hammer price (USD)	
	On auction date	Updated (2023)	On auction date	Updated (2023)	On auction date	Updated (2023)
Edmond de Belamy	7,000	8,453	10,000	12,075	432,000	521,645
Memories of Passerby I	39,543	46,922	52,724	62,562	52,724	62,562
Baronne de Belamy	20,000	23,732	30,000	35,598	25,000	29,625
Katsuwaka of the Dawn Lagoon	8,000	9,493	12,000	14,239	16,250	19,282
Mantiki logic	7,075	8,292	11,791	13,821	n.a.	n.a.

one.[13] The same day, however, Obvious's *Katsuwaka of the Dawn Lagoon* was auctioned at a price a slightly higher than its upper estimate. Yet, Obvious' beech wood sculpture *Mantiki (Logic)* simply found no buyer during its online auction sale.[14] Table 2 displays the lower estimates, upper estimates and hammer price in USD[15] at both the auction date and updated.[16] Figure 1 illustrates the evolution of lower and upper estimates as well as the hammer price. Figure 2 leaves aside the sale of the *Portrait of Edmond the Belamy* as it is an outlier. Five auctions are not enough to conclude to a downward trend with an absolute certainty. It seems however clear that the announcement effect is over. The fact that the 2018-2022 annual reports of *artprice.com* (worldwide art information database) only mention GenAI in 2018 in the context of the sale of *Portrait of Edmond de Belamy* and leave aside subsequent auctions seems to confirm that trend.[17]

Third, legal uncertainty prevails regarding the potential copyrightability of machine-enabled artworks, as it was recently stressed by the *World Intellectual Property Organisation* (2024). As it will be explored below, the USCO held in *Zarya of the Dawn* that machine-enabled artworks are not copyrightable if their authors do not express a sufficient control over them. This has an economic impact. Copyright is, indeed, an exclusive property right that grants its owner (the author or a third party to whom the latter would have transferred the right) a temporary monopoly (Pila & Torremans, 2019). Without copyright, the remuneration of the author is reduced to a trickle. This was actually at the core of the *Painer* ruling by the ECJ. Ms Painer was a freelance photographer who sold portrait photographs at a price that corresponded to the price of the prints.[18] She neither conferred any right over them nor consented to their publication. When they were nevertheless published in several newspapers and websites, she asked for "payment of appropriate remuneration and damages for her loss."[19] It is because she claimed a copyright that she requested a remuneration. The uncopyrightability of machine-enabled artwork therefore induces that the remuneration of GenAI users will be limited.

[13]'La Baronne de Belamy', Sotheby's, Lot 461 (2019) https://www.sothebys.com/en/auctions/ecatalogue/2019/contemporary-art-day-n10150/lot.461.html.

[14]'Mantiki (Logic)', Mutual Art, https://www.mutualart.com/Artwork/Mantiki-Logic/872F0AD66D2155AC.

[15]The lower and upper estimates and hammer price of *Memories of Passerby* were, respectively, GPB 30,000; GPB 40,000 and GPB 40,000. The sale occurred on March 6th, 2019. That day, the British Pound US Dollar exchange rate was 1.3181 (https://www.exchangerates.org.uk/GBP-USD-spot-exchange-rates-history-2019.html). The lower and upper estimates of *Mantiki Logic* were respectively EUR 6,000 and EUR 10,000. The sale occurred on October 15-27th, 2020. During that period, the average EUR-USD exchange rate was 1.1791. (https://www.exchangerates.org.uk/EUR-USD-spot-exchange-rates-history-2020.html).

[16]All inflation rates are available at https://www.officialdata.org/us/inflation/2019?amount=100.

[17]All reports are available at https://www.artprice.com/artmarketinsight/reports.

[18]*Painer*, §§27- 29.

[19]Ibid, §38.

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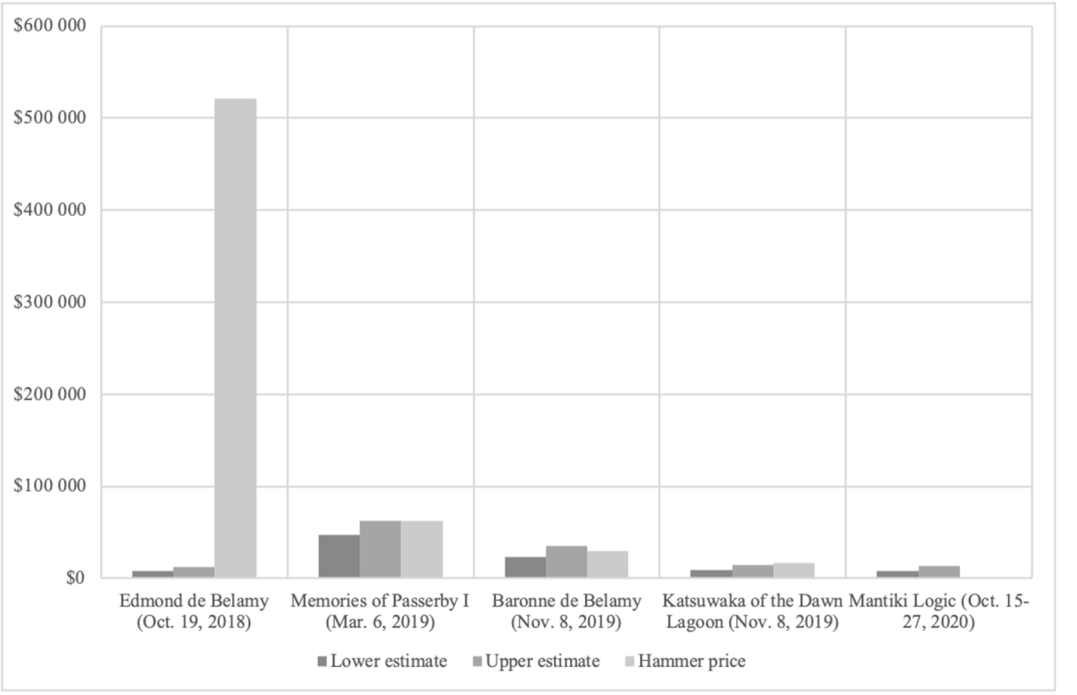

Figure 1. GenAI output auction trend – incl. Baron de Belamy.

Table 3. The lemons problem in the markets for (1) used car and (2) artworks – incl. GenAI

	Market for used cars	Market for artworks
Criterion	Worth of a used car ↦ quality of that car	Worth of an artwork ↦ origin of that artwork
Lemons	Cars that often need repairs	Fakes; forgeries; *machine-enabled artworks*
Peaches	Reliable cars	Genuine *human-made* artworks

This does not mean that the value of an artwork and its copyrightability are synonymous. As hinted above, what gives a work of art its worth is its aura. However, uncopyrightability (and the lack of temporary monopoly thereof) has an impact on the pecuniary value of an artwork, as suggested in *Painer*.

Upshot? Under symmetric information, it is fair to assume a machine-enabled artwork will be valued at a lower price than human-made one notwithstanding their aesthetical value. Even if this assumption turns out to be false later on, it should be borne in mind that GenAI creates something new so easily and at such a pace that the number of available machine-enabled artworks will soon skyrocket (Floridi & Chiriatti, 2020). Given this mass production, art buyers could well become bored (something hinted by the end of the announcement effect that followed the auctioned of *Portrait of Edmond de Belamy*) hence reverting to human-made artworks. Against that background, the higher valuation of human-made art will lag behind art buyers' loss of interest in machine-enabled one but it will exist nonetheless.

Using the artwork origin as a proxy for its quality is therefore still relevant. In this scenario, human-made artworks are the peaches; machine-enabled ones, the lemons (see Table 3 below).

However, the indistinguishability between human-made and machine-enabled art suggests asymmetric information. In addition, the assumed difference in valuation between human-made and

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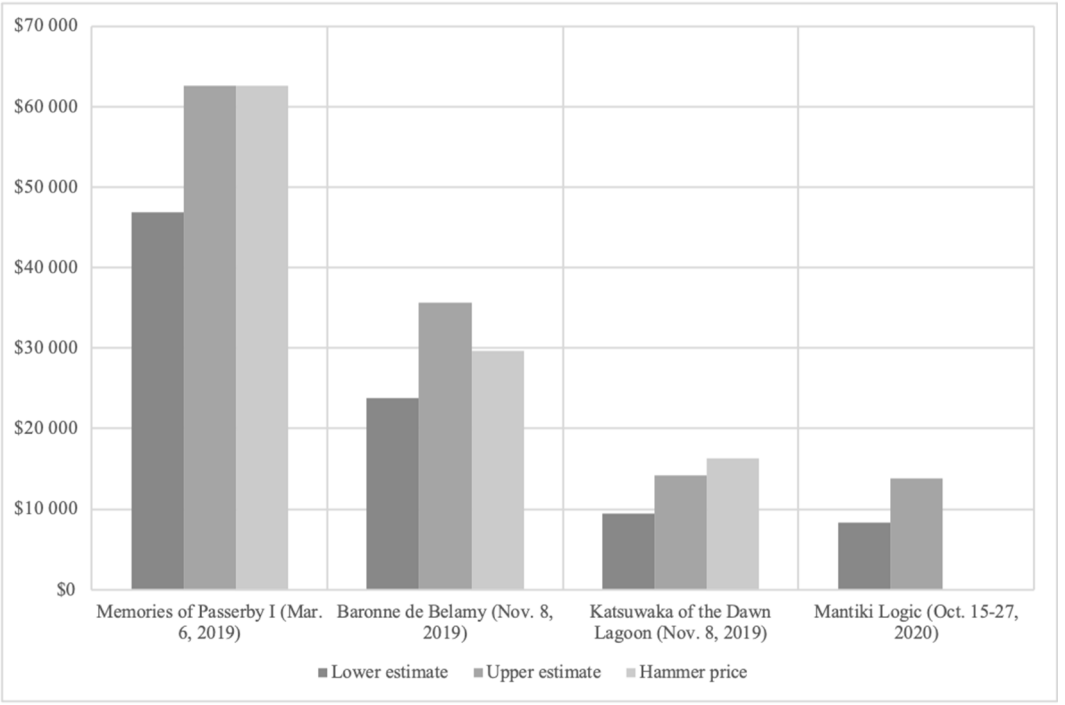

Figure 2. GenAI output auction trend – excl. Baron de Belamy.

machine-enabled incentivises sellers to cheat. Art buyers will thus probably internalize the risk of being sold a machine-enabled artwork the price of a human-made one. The market price of human-made artwork will therefore be lower than what it is worth under symmetric information. Considering the art market structure, it is unlikely that the lemons problem induced by GenAI will lead to a market collapse. Yet, there will still be imperfect market allocation to be corrected.

4. Art authentication

This section explores how to distinguish the undistinguishable. It first proposes a reading of the top-down rule of origin mandated within the EU (4.1). It then applies *mutatis mutandis* the substantial transformation test developed in customs and tax law to GenAI systems (4.2) and argues this was the pivotal point in the USCO decision not to copyright the images contained within *Zarya of the Dawn* (4.3). Finally, it stresses that a rule of origin can also be constructed bottom-up (4.4).

4.1 Top-down rule of origin

It should be borne in mind that a rule of origin a request from the art community. In 2022, Jason Allen's *Théâtre D'opéra Spatial* won the first price in the "Digital Arts/Digitally Manipulated Photography" category at the Colorado State Fair (Eliot, 2022). He later explained he used Midjourney to create his artwork. Public outcry followed in successive waves. In the beginning, Allen was accused of cheating. Yet, nothing in the rules of the contest (at least under this category) prevented the use of Midjourney. Others argued that if Allen complied to the rules, then the rules must be changed either by banning the use of AI in artwork submitted to the competition or by creating a new category for machine-enabled artwork. The latter option is akin to what photographer Eldagsen called after having declined the award for his litigious photography. He similarly distinguished human-made from

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machine-enabled artworks arguing that photography literally means drawing (-graphy) with light (photo-). Given that GenAI like Midjourney do not fit this definition, he suggested to name is work a "*prompt*tography" – i.e., drawing made by prompt (Glynn, 2023).[20]

This paves the way for what follows. Given GenAI introduces new indistinguishable products on a market that was already confronted to a lemons problem, it suffices to expand the authentication rule to machine-enabled artworks (Turner, 2019; Walsh, 2017). So far, authentication distinguished a genuine artwork from a fake or a forgery. From now on, it can similarly be used to draw a line between human-made and machine-enabled artworks.

This seems to be the solution chosen by the EU legislator in the Regulation (2024/1689) laying down rules on AI (hereafter, AIA). A complete discussion on its scope of application would go well beyond the purpose of this article (de Cooman, 2022). For the moment, it is enough to emphasise that, pursuant to the initial version,

> users of an AI system that generates or manipulates image, audio or video content that appreciably resembles existing persons, objects, places or other entities or events and would falsely appear to a person to be authentic or truthful ("deep fake"), shall disclose that the content has been artificially generated or manipulated. (art. 52(3): v.04/2021)

This is an embryonic (because limited to deep fake) top-down (because mandated by the EU lawmaker) rule of origin.

The compromise text of the EU Parliament's Committees on the Internal Market and Consumer Protection (IMCO) and on Civil Liberties, justice and Home Affairs (IMCO & LIBE, 2023; Novelli et al., 2024) maintained this requirement (art 52(3): v.05/2023). Although it was not clear whether it applied to all machine-enabled outputs or solely to deep fake,[21] this version of the AIA introduced an exception holding that the transparency requirement

> shall not apply where the use of an AI system that generates or manipulates text, audio or visual content (…) is necessary for the exercise of (…) the right to freedom of the arts' (art 52(3a): v.05/2023) that covered, according to the ECJ, 'artistic expression,'[22] and should, pursuant to Article 13 of the EU Charter of Fundamental rights, 'be free of constraint'.

It is perhaps in light of this risk of ineffectiveness that the EU legislator has reformulated this provision in the latest (*corrigendum*) version of the AIA that now states that "providers of AI systems, including general-purpose AI systems, generating synthetic audio, image, video or text content, shall ensure that the outputs of the AI system are marked in a machine-readable format and detectable as artificially generated or manipulated" (art. 50(2), *in limine*, v.04/2024). Interestingly, the AIA also organises an exception that echoes the substantial transformation test advocated above. Indeed, the obligation to mark machine-enabled outputs as such "shall not apply to the extent the AI systems perform an assistive function for standard editing or do not substantially alter the input data provided by the deployer or the semantics thereof" (art. 50(2), *in fine*, v.04/2024). This immediately raises the question of defining the threshold for substantial modification on which the text remains, however, blatantly silent.

4.2 Substantial transformation

In the context of GenAI, a simple rule of origin suggests a distinction between human-made (GenAI-free) and machine-enabled artworks, as soon as GenAI is used in the creative process. This is

[20] See Boris Eldagsen's interview (Glynn, 2023). Eldagsen attributed "promptography" to a Peruvian photographer.

[21] A broad reading would be in line with recital 60 g: v.05/2023.

[22] Case C-476/17, *Pelham GmbH, Moses Pelham, Martin Haas v Ralf Hütter, Florian Schneider-Esleben*, ECLI:EU:C:2019:624, §35.

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inappropriate. Such a dyadic authentication would discard the fact that GenAI might be solely used to edit or perform slight modifications. Therefore, the exception made by the AIA in similar instances is laudable. One should however wonder what is a substantial modification and whether this exception is appropriate give that, despite this exception, the AIA seems to treat in the same way, e.g., a text-to-image GenAI when prompted with one single sentence and a work of art that required hundreds, if not thousands of detailed instructions.[23] The latter piece owes its existence more to the human user than the former. Should they still be both classified as machine-enabled?

One solution to substantivize the "substantial alteration" criterion built-up in the AIA can be found in geographical rules of origin that establish the provenance of goods and services for tax purposes. In short, a rule of origin grants a member to a trade agreement access to the domestic market of another member at a preferential tariff (Inama, 2009). To maximise their turnover, some undertakings kept their production in countries where labour was cheap but exported the final stage to a country that could benefit from a tariff cut. EU law explains why undertakings willing to have the cake and eat it too are doomed to fail. Pursuant to the Union Customs Code, "goods the production of which involves more than one country or territory shall be deemed to originate in the country or territory where they underwent their last, substantial, economically-justified processing or working (…) resulting in the manufacture of a new product or representing an important stage of manufacture."[24] According to the ECJ, this "substantial transformation test" suggests a process or an operation is substantial if "the product resulting therefrom has its own properties and a composition of its own, which it did not possess before that process or operation."[25] Interestingly, the ECJ later held that the substantial transformation test "can be expressed by the ad valorem percentage rule, where either the percentage value of the materials utilized or the percentage of the value added reaches a specified level."[26]

The zeitgeist of the substantial transformation test is this: (a) several different geographical areas may be involved in the production process of a product, (b) its country of origin is not necessarily the last country through which the product passes before reaching its relevant market and (c) the country of origin can only be the one in which the product was substantially transformed for the last time. When transposed *mutatis mutandis* to machine-enabled artwork, this suggests that (a) an artwork may owe its existence to both human and machine, (b) the fact that a human edited the artwork before being made available to the public does not mean it is human-made and (c) that the artwork will only be labelled as human-made if the human input is substantial vis-à-vis the role of the machine. One way to measure this substantiality could be the application of an ad valorem rule (i.e., to compare the properties of the artwork before and after any human editing by assessing the added value of human intervention in the creation). If so, then it is fair to assume human edits consisting merely of sorting, classifying or assembling the output of a GenAI system are unlikely to be considered substantial.[27]

4.3 Substantial transformation and control over creation

To some extent, the question of the substantial transformation was at the heart of the USCO decision not to copyright the images contained within *Zarya of the Dawn*. In this case, the USCO discarded copyrightability not because Midjourney was used but because its user did not prove she controlled the creative process. This is in line with both *Burrow-Giles* (in the US)[28] and *Painer* (in the EU).[29]

[23] Allen declared he prompted Midjourney over and over again to the extent that he generated around 900 different versions.

[24] Regulation (EU) No 952/2013 of 9 October 2013 Laying Down the Union Customs Code, OJ L 269/1, art 60(2).

[25] Case C-49/76, *Gesellschaft für Überseehandel mbH v Handeskammer Hamburg*, ECLI:EU:C:1977:9, §6.

[26] Case C-26/88 *Brothers International GmbH v Hauptzollamt Gießen*, ECLI:EU:C:1989:637, §21.

[27] Article 34 Commission Delegated Regulation (EU) 2015/2446 of 28 July 2015 Supplementing Regulation (EU) No 952/2013 as Regards Detailed Rules Concerning Certain Provisions of the Union Customs Code, OJ L 343/1.

[28] *Burrow-Giles*, §60.

[29] *Painer*, §§87-89.

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In *Painer*, the ECJ interestingly chose to distinguish the artwork creation in a three-stages process composed of the preparation phase, the taking of the portrait photograph and the selection phase.[30] The creative process was later generalised to be described as an iteration of three successive steps, namely the conception, the execution and the redaction (Hartmann et al., 2020). At the conception stage, the author chooses for instance the subject and the style of what she plans to realize. At the execution stage, what was decided during the conception is translated into drafts. At the redaction phase, the author finalizes her artwork by choosing amongst the draft version she needs to rework before making it available to the public. The ECJ held that an author "can stamp the work created with his [sic] 'personal touch'"[31] at each of these three stages.[32]

An AI system intervenes to varying degrees depending on the stage of the procedure. At the conception stage, GenAI is not involved. This is still the realm of human. However, GenAI plays "the dominant role" at the execution stage by producing "sophisticated output in ways that the user of the system will not be able to (precisely) preconceive, understand or explain" (Hartmann et al., 2020). This does not mean there is no room for creativity at this stage. In some instances, the human artist will be in charge of "constantly monitoring the output of the process and giving feedback to the AI system, by adjusting weights and parameters to better match pre-defined objectives" (Hartmann et al., 2020). The fact that the human author is not directly in charge of the execution is not a stop-shot. Outsourcing this execution to a machine is exactly what photographers Sarony and Painer did with their respective cameras. This applies to GenAI that follows their users' instructions and, therefore, are "incapable of being more than obedient agents in the service of human principals" (Ginsburg & Budiardjo, 2020). At the redaction phase, the role of the human author will oscillate between, on the one hand, the simple selection of the result produced by the AI system to be presented to the public and, on the other hand, a real editing job, depending on whether the production of the GenAI system is ready to use or not. In this regard it has been argued that 'creative choice at the redaction phase may even suffice for a finding of originality of the entire production' (Hartmann et al., 2020). A work is therefore copyrightable if its author manages to exercise free and creative choice by controlling the *conception* of the artwork beyond a mere idea – the "what" – and directly or indirectly its *execution* – the "how" (Ginsburg, 2003).

According to the Office's understanding of Midjourney, Ms. Kashtanova controlled the conception but did not exercise a sufficient control toward the execution because the initially prompted images were generated "in an unpredictable way" based on a "randomly generated noise" which is refined based on tokens created from user prompts that relate to Midjourney's training database."[33] For the Office, this means that "while additional prompts applied to one of these initial images can influence the subsequent images, the process is not controlled by the user because it is not possible to predict what Midjourney will create ahead of time."[34]

The argument based on randomness is interesting. Copyright law "tolerates some degree of randomness in a work's execution" (Ginsburg & Budiardjo, 2020). It is only at a certain point "at which the putative author has surrendered so much control over the execution that the independence of the work's embodiment calls into question whether her initial conception of the work was anything more than a general idea" (Ginsburg & Budiardjo, 2020). As a result, an artwork that completely relies on randomness is uncopyrightable (Kurant, 2016). More concretely, this suggests that authors may not "maintain absolute control over the execution" and, instead, may "rely on external forces, like randomness and nature, to complete' their work as long as they bent these forces to their will (Ginsburg & Budiardjo, 2020). Intuitively, this leads to Jackson Pollock who "poured, dripped, and spattered paint onto canvases he had place on the floor" and who insisted that he, despite appearances, exercised a

[30] Ibid, §90.
[31] *Painer*, §92.
[32] Ibid, §91.
[33] USCO, 'Zarya' 9
[34] Ibid, 8-9.

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high control over his painting (Durham, 2002). The question is therefore whether Ms. Kashtanova exercised enough control despite the random generation of noise as its starting point. It should be borne in mind that Midjourney uses "a randomly generated seed number to create a field of visual noise, like television static, as a starting point to generate the initial image."[35] However, users are able to specify the seed numbers by defining two parameters ("–seed or – sameseed").[36] This suggests it is possible to exercise some control over the creation.

Whether, in the particular case of *Zarya of the Dawn*, this control was (or not) enough is not the most important element here.[37] Much more critical is the evidential scheme of the decision. A machine-enabled artwork will be copyrightable if and only if the human artist exercises sufficient control towards what is created, namely, if she is able to *substantially transforms* the artwork while stamping her personal touch. To prove this, she will need to provide the prompts she wrote to generate images as well as (intermediary) image proofs and parameters used to frame the results. Actually, this was the logic followed by the Czech court which held that if GenAI users are not able to prove that the generated image is the result of their unique creative contribution, then it cannot be work of authorship.[38] Therefore, human artists using GenAI systems anticipating copyright litigation would be well advise to keep such documentation. Doing so, they would de facto establish a bottom-up rule of origin that draws "clear boundaries between what is what, e.g., in the same way as a restored, ancient vase shows clearly and explicitly where the intervention occurs" (Floridi & Chiriatto, 2020).

4.4 Bottom-up rule of origin: signalling

The European Writers' Council (2024) welcomed the introduction of the AIA rule of origin but stressed "the importance of developing technical tools that may reliably and accurately differentiate authentic content from AI-generated" one. In light of this, one should note that solving indistinguishability does not solely lie in the hands of regulators. Honest artists could develop their own bottom-up rule of origin to signal the human origin of the art. In economic jargon, this is known as signalling from the perspective of the sellers (Spence, 1974) or screening or sorting from the perspective of the buyers (Stiglitz, 1975). To keep complex things simple, a signal is the result of "efforts by sellers to 'tell' buyers about the products, and therefore to change the initial asymmetric informational structure of the market" (Spence, 1976). Father of signalling theory Spence (2002) explained that a signal is useful "when there is an *unobservable attribute* that is valuable to buyers."

Depending on three conditions, signalling has the potential to overcome asymmetric information (Löfgren et al., 2002). This signal must first be credible. For instance, the buyers' verbal declarations are a low-cost signal that is, however, not credible given that "words are cheap, and therefore do not provide the means by which high quality sellers can differentiate their products" (Spence, 1974). The signal must also not be too expensive (Mamada, 2022). It is traditionally argued that a seller invests in signalling until the marginal gain driven from the signal is equal to its marginal opportunity cost (Riley, 1979). The signal must finally be costlier for sellers of poor-quality products than for sellers of good-quality one (Kirmani & Rao, 2000). A warranty, for instance, is costlier for sellers of lemons because they will repair, replace or refund the product more often than sellers of peaches. It is therefore a strong signal for "experience products," namely those whose quality can be evaluated after the purchase (Nelson, 1974). For this reason, however, this signal does not fit the human-made art. There is no "information feedback" after the sale, in the sense that the origin of the product (either human-made or machine-enabled) will not be disclosed later on (Spence, 1974).

[35] Midjourney, 'Seeds' https://docs.midjourney.com/docs/seeds.

[36] Ibid.

[37] USCO, 'Zaria', 10 (the Office acknowledged that 'it is possible that other AI offerings that can generate expressive material operate differently than Midjourney does').

[38] C-13/2023-16, Municipal Court in Prague, 11 October 2023, https://justice.cz/documents/14569/1865919/10C_13_2023_10/108cad3e-d9e8-454f-bfac-d58e1253c83a.

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An efficient signal proving human origin of an artwork could be the adjunction of a video time-lapse recording of the artist while painting or sculpting (de Cooman, 2023). This way, buyers will be able to see for themselves the origin of the work they buy. This is an old idea: after the Musée du Louvre purchased the *Tiara of Saïtapharnès* in 1896, experts questioned its origin. Doubts spread until goldsmith Israel Rouchomowsky came to claim the authorship and explain the Tiara had been commissioned by art dealers who then dishonestly passed it off as an antique (an objective that the artist was unaware of). As the Louvre's art connoisseur did not believe him, Rouchomowsky produced "documentation with studio photos and, without seeing the Tiara, recall and recreate minute details from the composition" (EmBree & Scott, 2015).

Of course, this will not fit all type of artistic expression. Recording or photography of book writers hankered over their keyboard while typing would prove absolutely nothing. A second-best solution could be the one OpenAI (2022) proposed, namely to "indicate that the content is AI-generated in a way no user could reasonably miss or misunderstand." Academic and non-academic publishers endorsed this recommendation. *Taylor & Francis, Nature, Science* and the *Authors Guild* (a professional organisation for published writers) have decided that the use of GenAI should be acknowledged in an ad hoc section (Authors Guild, 2023; Stokel-Walker, 2023).

It is doubtful, however, that a voluntary reporting scheme is credible signal given that indistinguishability incentivises dishonest dealings. One way to make such disclosure trustworthy is technical. It is perfectly conceivable to design GenAI systems in such a way that they watermark the generated output (Hacker et al., 2023). Concretely, this means the signal is incorporated "into generated text that are invisible to humans but algorithmically detectable from a short span of tokens" (Kirchenbauer et al., 2023; Yang et al., 2023). The idea is that watermarked contents are "private to individual users" because they "can be certified only by users who know the tokens" (Liu et al., 2024). In this respect, the token is similar to a certificate of authenticity. Although technologically savvy users could find a way to remove these watermarks, average users are unlikely to be able to do so (Gu, 2022).

This framework suggests that there might be a need for machine-enabled art connoisseurs proposing their expertise to authenticate the human or artificial origin of an artwork by screening for watermarks or for evidence the latter were removed. This service stems from Schumpeterian creative destruction (Schumpeter, 1942).[39] Historically, the need for art experts coincides with the rise of forgeries (Amineddoleh, 2015). In addition, it is worth noting the relationship between art experts and appraised artworks is circular and, to some extent virtuous: "as prices escalate, the need for a connoisseur's opinion rises; and as connoisseurs vouch for works and their authenticity, the works are more coveted, leading art market prices to soar even higher" (Amineddoleh, 2015). Similarly, the emergence of (the risk of) machine-enabled artwork sold as human-made should trigger the need for machine-enabled art connoisseurship that, in the end, results in a higher valuation of human-made art.

5. Conclusion

This paper is built on two assumptions. First, human-made and machine-enabled artworks are indistinguishable. Second, they are valued differently, human-made artworks assuming the role of good-quality products (valuable origin). The indistinguishability and difference in valuation create an incentive to cheat, namely, to sell a machine-enabled artwork as a human-made one to increase its sale price. Given they have incomplete information, buyers will internalize the risk of dishonest dealings in their willingness-to-pay. As a result, human artists will never be able to receive the true value of their art. They will therefore exit the market.

[39] Joseph Schumpeter defined the process of creative destruction as the never-ending innovation that incessantly destroys old economic structure while simultaneously creating new ones.

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It is tempting to read this conclusion as a Luddite argument. It is not. This paper is not a pamphlet against machine-enabled artworks to unduly protect human artists. On the contrary, this is a call for better competition between human-made and machine-enabled works of art. For now, the asymmetric information and the resulting adverse selection induce that competition between human-made and machine-enabled artworks is not on the merits but bears on adverse selection.

Against that background, this article has proposed a rule of authentication ensuring symmetric information between buyers and sellers. Although the AIA failed to mandate a top-down rule of origin, artists, seeing nothing but a cloud of dust in the sun and the green grass, could develop their own bottom-up rule of origin (either to signal the human origin or to document the creative process anticipating copyright litigation). In this scenario, human-made and machine-enabled artworks will truly compete on their intrinsic quality. The benefits of such solution are twofold. First, a rule of origin allows those who value human-made artworks more than machine-enabled ones to buy the product at the correct price. Yet, it has absolutely no impact on buyers who do not care of the artwork provenance as long as it is of high aesthetic quality. Second, the proposed rule of origin acknowledges that human-made and machine-enabled is not a binary distinction. As such, it is suggested to map all human inputs that occurred in the creation of a machine-enabled artwork. This identification could be of utmost interest for copyright. The documentation of the creation process should facilitate the identification of the elements for which users of GenAI have made free and creative choices reflecting their personality.

To conclude, the proposed rule of origins purges from the market any artificial preference or undue advantage of one product over another – by solving information asymmetry. May the best artwork prevail – as long as the competition is purely on the merits.

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