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Defending humankind: Anthropocentric bias in the appreciation of AI art

Kobe Millet [a,*], Florian Buehler [b], Guanzhong Du [c], Michail D. Kokkoris [a]

[a] School of Business and Economics, Vrije Universiteit Amsterdam, 1081 HV, Amsterdam, Netherlands
[b] Department of Business and Management, Vorarlberg University of Applied Sciences, 6850, Dornbirn, Austria
[c] Sauder School of Business, University of British Columbia, V6T 1Z2, Vancouver, Canada

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ABSTRACT

We argue that recent advances of artificial intelligence (AI) in the domain of art (e.g., music, painting) pose a profound ontological threat to anthropocentric worldviews because they challenge one of the last frontiers of the human uniqueness narrative: artistic creativity. Four experiments ($N = 1708$), including a high-powered preregistered experiment, consistently reveal a pervasive bias against AI-made artworks and shed light on its psychological underpinnings. The same artwork is preferred less when labeled as AI-made (vs. human-made) because it is perceived as less creative and subsequently induces less awe, an emotional response typically associated with the aesthetic appreciation of art. These effects are more pronounced among people with stronger anthropocentric creativity beliefs (i.e., who believe that creativity is a uniquely human characteristic). Systematic depreciation of AI-made art (assignment of lower creative value, suppression of emotional reactions) appears to serve a shaken anthropocentric worldview whereby creativity is exclusively reserved for humans.

1. Introduction

> I'm mad at myself for actually enjoying this. Well, we had a good run. R.I.P. Humanity.
>
> For Sale

> AI makes a beautiful song Humans: OMG WE'RE GONNA DIE
>
> Gretgor

> am i the only one that while hearing this i imagine several terminators destroy human civilization?
>
> The Grabisoft

Artificial intelligence (AI) has grown exponentially in the first decades of 21st century (Tang et al., 2020) to the extent that our time has been called the age of AI (Iansiti & Lakhani, 2020) or the fourth industrial revolution (Schwab, 2017). Recently, AI has been involved not only in tasks that require analytical skills, such as translating languages (Hao, 2020), diagnosing COVID-19 (Mei et al., 2020), ordriving cars (Chafkin, 2016), but also in a domain that can be considered prototypically human: artistic creativity (Samuel, 2019). Research in the emerging field of computational creativity suggests that AI can engage in authentic artistic creation, which extends beyond emulating already existing artistic styles (Arriagada, 2020; Carnovalini & Rodà, 2020; Colton & Wiggins, 2012; Jordanous, 2012; Toivanen et al., 2019). For example, AI has not only created paintings that look like the work of renowned masters like Rembrandt (Iansiti & Lakhani, 2020) but has also created original artistic styles (Schwab, 2017) that have been sold in auctions at high prices (BBC, 2018). Moreover, AI has composed original songs (Vincent, 2016) and music scores (Silicon Luxembourg, 2018), has written poetry (Gibbs, 2016), and has designed whole cities and houses (Chaillou, 2019). Importantly, these AI products are often indistinguishable from human-made art and blind tests show that people assign high artistic value to them (Elgammal et al., 2017). This means that individuals nowadays are increasingly exposed to situations resembling the Turing test (Turing, 1950), where they might not distinguish a musical piece or a painting generated by AI from those generated by humans.

How do people respond to AI-made art and how does that relate to people's beliefs about human nature? The question is timely because this technological development represents perhaps the ultimate frontier of AI and has the potential to seriously challenge people's beliefs not only about the nature of artistic creation but also about the defining features of humankind more broadly. Besides raising survival concerns, such as unemployment (Granulo et al., 2019; Huang & Rust, 2018) or extinction of humankind (Cellan-Jones, 2014), AI can also erode humans'

* Corresponding author.
E-mail addresses: kobe.millet@vu.nl (K. Millet), florian.buehler@fhv.at (F. Buehler), guanzhong.du@sauder.ubc.ca (G. Du), m.kokkoris@vu.nl (M.D. Kokkoris).

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ontological security about their unique position in the world (Cha et al., 2020; Chan, 2017; Eyssel & Kuchenbrandt, 2012; Ferrari et al., 2016; Yogeeswaran et al., 2016; Złotowski et al., 2017). The opening quotes featuring YouTube comments on the video "Daddy's Car", an AI-generated song in the style of the Beatles released by Sony (Vincent, 2016), provide some anecdotal evidence about these perceived threats. Apparently, instead of commenting on the aesthetic value of the song or their enjoyment while listening to it, viewers seem more concerned about the fate of humankind. We posit that AI induces such negative reactions because – besides the pragmatic survival concerns it gives rise to – it shakes people's deep-rooted anthropocentric views of the world. In this article we provide empirical evidence that AI-made art is appreciated less than human art because of its threat to an anthropocentric worldview.

Anthropocentrism refers to the perceived precedence of the human species over other species (Fortuna et al., 2021). The term derives from the Ancient Greek words "anthropos" (human being) and "kentron" (center) and represents the "philosophical viewpoint arguing that human beings are the central or most significant entities in the world" (Encyclopaedia Britannica, n. d.). Although anthropocentrism is often used interchangeably with speciesism (e.g., Schmitt, 2020), the terms differ in that speciesism posits the precedence of any species over other species, whereas anthropocentricism is one among various types of speciesism and posits specifically the superiority of the human species (e.g., Faria & Paez, 2014). An anthropocentric worldview seems to be a pervasive bias evidenced already in children, although it is more likely culturally shaped rather than innate (Herrmann et al., 2010). Moreover, anthropocentrism, also referred to as human supremacy or human exceptionalism, informs discourses in various spheres of life, such as cognition and biological thinking (Coley & Tanner, 2012), ecology (Kortenkamp & Moore, 2001), human rights (Smith, 2012), and animal rights (Batavia, 2020).

It has been suggested that this preferential treatment of the humankind over other species can be an obstacle to AI acceptance (Schmitt, 2020). We believe this to be the case especially in the case of AI art. This is because AI art is harder to reconcile with anthropocentrism than other types of AI activity, where predominantly analytical, mechanical, or computational skills are required. Research shows that people are less willing to accept the involvement of AI in more prototypically human tasks (Castelo et al., 2019) or in products with higher symbolic value (Granulo et al., 2021). Unlike more analytical skills, where it can be more easily accepted that robots can compete with or even surpass humans, artistic creativity is often depicted as the essence of being human and a core differentiating feature of humans compared to other species (Arriagada, 2020; Chamberlain et al., 2018; DeFelipe, 2011; Hennessey & Amabile, 2010; Hertzmann, 2018). It is almost a mystified process that is tightly linked to properties such as corporeality, soul, emotions, insight, history, pain, suffering, etc. Creativity is central in art and is defined as the creation of something new and useful (e.g. Burroughs et al., 2008). If computers – presumably lacking some or all of these properties – are also capable of engaging in artistic creation, then the experience of AI art might be phenomenologically equivalent to the experience of the irrevocable breaching of one of the last bastions of anthropocentrism.

As a consequence, we expect people to respond to AI art by derogating its artistic value in order to defend their threatened anthropocentric worldview. Past research on motivated reasoning has shown similar reactions to various types of psychological threats (Bastian & Loughnan, 2017; Graça et al., 2016; Piazza & Loughnan, 2016). People often recall, construct, and evaluate information in ways that conform with their current motivations (Epley & Gilovich, 2016; Hart & Nisbet, 2012; Kunda, 1990). Critically, motivated reasoning is more pronounced in domains that are important to people. Given that AI art can represent a profound psychological threat as people's ontological security is at stake, they should be particularly invested in biased processing of information in this context. Therefore, we propose that people respond to the threat posed by AI-generated art by underestimating the value of AI-generated artistic products so that they align their judgments with their anthropocentric beliefs.

Motivation-driven biased processing of information is favored in ambiguous situations, where there is some leeway to interpret facts in alternative ways (Ditto et al., 2009; Kunda, 1990). Artistic creativity is a domain that offers such interpretational freedom. Experiences of art are characterized by a high degree of subjectivity, which renders them more vulnerable to motivated-driven biases. This allows individuals to express biased emotional reactions to AI-generated artworks without the fear of downright violating explicit objectivity rules. Behaviorally, we expect this derogation of AI art to be manifested by overt expressions of lowered experienced awe.

Awe concerns feelings of wonder, sublime or impressiveness (Shiota et al., 2007). It has not only been highlighted as an emotion associated with aesthetic experiences (Keltner & Haidt, 2003; Schindler et al., 2017), but is more so considered to be the principal emotional reaction to art (Fingerhut & Prinz, 2018) and beauty (Johnson-Laird & Oatley, 2021). Given the importance and centrality of awe in the appreciation of art, in this research we focus on this specific emotion. If people are indeed biased against AI art, we expect them to express less awe toward a work of art when they are told that it is AI-made as opposed to human-made. Thus, formally:

H1. People will express less awe for the same work of art when it is labeled as AI-made (vs. human-made).

However, individuals cannot bend the rules of logic indiscriminately. Rather, they are inclined to maintain an illusion of objectivity and strive to appear rational to themselves and others (Festinger, 1957; Kunda, 1990). Even though the experience of art is characterized by a degree of subjectivity, individuals nevertheless experience negative emotions such as guilt or shame when their emotional experiences deviate from objective (social or personal) standards (Goffin & Cova, 2019). We propose that biased creativity assessments can account for biased experiences of awe as a response to AI-made art. In other words, people might admire AI-made (vs. human-made) art less and let themselves be less impressed by it because they (convince themselves to) view it as less creative. Artistic creativity assessments lend themselves to such self-serving distortions because they are malleable and far from consensual. Moreover, there is an ongoing debate in the field of computational creativity as to what extent there can be objectively defined criteria to assess the creative value of AI products (Arriagada, 2020; Jennings, 2010) – and if we can speak of creative value in the first place (Hertzmann, 2018). In short, we predict that biased creativity perceptions can account for people's lowered experiences of awe in the case of AI-made (vs. human-made) works of art. Formally:

H2. People will perceive the same work of art as less creative when it is labeled as AI-made (vs. human-made).

H3. Lower perceived creativity explains why people express less awe for a work of art labeled as AI-made (vs. human-made).

We also expect this effect to have downstream consequences for art appreciation in economic terms. This matters because people's tendency to defend their anthropocentric worldviews by derogating AI art might have substantive economic, business, and societal consequences. If people are not willing to buy an AI-made work of art simply because it challenges their human supremacy ideology, this might impede technological progress and acceptance. Therefore, building on prior work about AI acceptance in marketing contexts (Granulo et al., 2021), we examined whether the general bias against AI art translates in decreased preference to buy AI art.

H4. People will have a lower preference to buy the same work of art when it is labeled as AI-made (vs. human-made).

Whereas we have argued that we expect a general tendency of people

to experience less awe and perceive lower creative value vis-à-vis AI-made (vs. human-made) artworks, we must note that we expect this effect to be mainly driven by individuals who endorse anthropocentric creativity beliefs more strongly. We define anthropocentric creativity beliefs as the conviction that creativity is a uniquely human characteristic that constitutes the essence of being human and differentiates humans from other species. By and large, we expect anthropocentric creativity beliefs to be widely shared by people. At the same time, we also expect considerable variation. For example, recent scientific developments have challenged the precedence of humankind and have advanced a more balanced view of humans in the animal kingdom (Pollan, 2013). Given that scientific evidence often permeates public discourses and becomes accessible to wide audiences more than ever before, anthropocentric creativity beliefs are likely to range across the population and not be uniformly high. If our proposition holds that the derogation of AI art originates from the threat to people's deep-rooted anthropocentric views of the world, this should be more pronounced for people that strongly endorse anthropocentric creativity beliefs. Formally:

H5. Bias against AI-made (vs. human-made) art will be stronger among people with higher anthropocentric creativity beliefs.

H5a. People will express less awe for the same work of art when it is labeled as AI-made (vs. human-made) the more they endorse anthropocentric creativity beliefs.

H5b. People will perceive the same work of art as less creative when it is labeled as AI-made (vs. human-made) the more they endorse anthropocentric creativity beliefs.

H5c. People will have a lower preference to buy the same work of art less when it is labeled as AI-made (vs. human-made) the more they endorse anthropocentric creativity beliefs.

Finally, putting all pieces of the puzzle together, we predicted a serial mediation path from perceived creativity to awe and then to preference to buy. In other words, we expected a work of art labeled as AI-made to be perceived as less creative, which would in turn induce less awe, and therefore would be preferred less than the same work of art labeled as human-made. Formally:

H6. A work of art labeled as AI-made (vs. human-made) will lead to lower preference to buy via inducing a) lower perceived creativity and b) lower awe (in this order).

And in line with our reasoning outlined above, we expect anthropocentric creativity beliefs to moderate this entire serial mediation chain. That is, the bias against AI-made art in terms of perceived creativity, experienced awe, and finally preference to buy (in this sequence) will be stronger among people who believe that creativity is a uniquely human characteristic. Formally:

H7. A work of art labeled as AI-made (vs. human-made) will lead to lower preference to buy via inducing a) lower perceived creativity and b) lower awe (in this order) the more people endorse anthropocentric creativity beliefs.

2. Overview of studies

We tested these hypotheses in four experiments. In all studies, participants were shown a piece of AI-made vs. human-made art and were asked for which of the two pieces they experienced more awe (Studies 1–4), which one they perceived as more creative (Studies 1–2 and 4), or which one they would prefer to buy (Study 4). Whereas Studies 1 and 2 focused on the mediating role of perceived creativity, Study 3 examined the moderating role of anthropocentric creativity beliefs on awe. Finally, preregistered Study 4 tested all these effects (main effect on awe, mediating role of creativity, moderating role of anthropocentric creativity beliefs) and its downstream consequences on preference to buy, while also testing a comprehensive moderated serial mediation model from perceived creativity to awe and then to preference to buy.

This research complies with all relevant ethical regulations regarding human research participants of the American Psychological Association (APA). Participants provided informed consent before voluntary participation in each study, and they were compensated for their time with either course credit (Study 1) or flat fee (Studies 2–4) and could stop at any time. Measurements were taken from distinct samples. All measures, experimental manipulations and potential data exclusions are reported. All test statistics are two-sided. For all parametric tests, data were assumed to be normal but it was not formally tested. However, the methods of data analysis (ANOVA, bootstrapping analysis) do not rely on any normality assumption for valid inference. Preregistration of Study 4 and data are publicly available at ResearchBox (*#361*).

3. Study 1

Study 1 tested in the domain of music whether people have a negative bias against AI-made art expressed in terms of awe (Hypothesis 1) and whether perceived creativity mediates this effect (Hypothesis 2). Importantly, we tested whether these effects hold irrespective of the artwork itself. Participants listened to two pieces of music, which were actually both created by the same AI agent. We manipulated the identity of the creator by telling participants that one piece of music was human-made and the other one AI-made (counterbalanced across participants). We then asked them for which piece they experienced more awe and also which one they perceived as more creative.

3.1. Method

Participants were 206 students from a large Dutch university (M_{age} = 20.36; 30.6% women), who took part in return for course credit. The sample size was determined by the number of students enrolled in the specific course. A sensitivity power analysis with $\alpha = .05$, 80% power (using G*power; Faul et al., 2007) showed that the smallest detectable effect size with the sample size used in the analyses was $f = 0.20$ ($\eta_p^2 = 0.04$).

The study was conducted in the lab. Participants were told that the objective of the study was to evaluate two pieces of music that they would listen during the study. Both stimuli were in reality composed by an AI system (AIVA, 2020). They were informed that one piece of music was from a human artist and the other piece from an AI artist. We further explained: "AI artists are artificial intelligence systems that are able to create music autonomously, meaning they come up with an idea for a song and compose it. No humans are involved in the creation of the song." After a short audio test to make sure that the headphones and sound on their computer was working properly, they listened to the two pieces of music. We displayed on one screen the two pieces of music next to each other, each with a mock-up album cover and a label stating either 'HUMAN ARTIST' or 'AI ARTIST'. Both the order of the labels and the order of the two pieces of music were counterbalanced between subjects (Fig. 1). To make sure that participants listened to the music carefully, we added a vocal number at the end of the song, which they had to enter after listening. Eight participants who entered an incorrect number were excluded from further analyses. Excluding these participants did not change the results and conclusions.

After listening to the stimuli, participants were asked to evaluate the pieces on different aspects based on the feelings they experienced when listening to the pieces. Drawing on the prototype approach of Keltner and Haidt (2003), we assessed the dependent measure, awe, with three items that tap into awe's core features when the experience is elicited by paintings or music: wonderful, magnificent, and gorgeous (Cronbach's alpha = .75). Participants were instructed to move a slider with the two pieces of music as its endpoints towards the piece they believed to be more wonderful, more magnificent, and more gorgeous (each item was coded continuously from 0 to 100 but participants did not see any

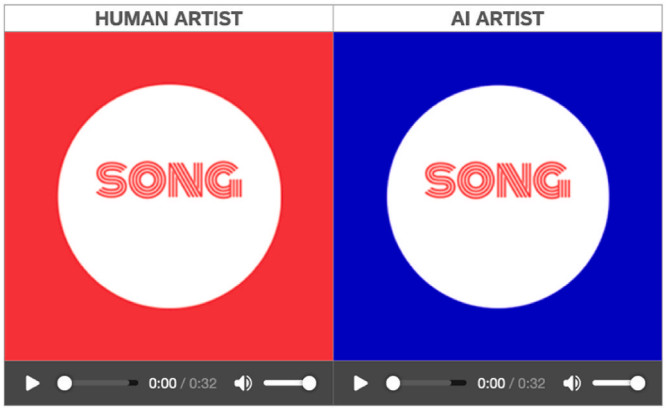

Fig. 1. Illustration of stimuli used in Study 1.

numerical indication on the slider). Next, we assessed the mediator, perceived creativity of the piece, with two items: creative and original (Cronbach's alpha = .78) on the same slider scale. If our prediction holds that participants are biased in favor of humans and against AI, we would find that participants shift their awe or creativity evaluations more to the left (i.e., below 50) when the left piece of music is labeled as human-made, and more to the right (i.e., above 50) when the right piece of music is labeled as human-made. Since we randomized both the position (left/right) of the two pieces and the position (left/right) of the two labels indicating the identity of the composer, any systematic shift towards the human-made piece and away from the AI-made piece would indicate a bias in favor of human-made music and against AI-made music as this would be independent of position (left or right) and content (piece A or piece B). We used this setup in all of our studies to control for any intrinsic properties of the stimuli or position effects.

3.2. Results

In line with Hypothesis 1, participants experienced less awe when the piece of music was labeled as AI-made (vs. human-made). Specifically, their awe scores were skewed to the left when the human-made piece was on the left (N = 102, M = 44.69, SD = 23.56, 95% CI = [40.06, 49.32]) and to the right when the human-made piece was on the right (N = 96, M = 54.31, SD = 20.43, 95% CI = [50.17, 58.45]), $F(1, 196) = 9.37$, $p = .003$, $\eta_p^2 = 0.05$. This analysis allows us to conclude that participants' bias is due to the information about the source (AI vs. human) and independent of the art content. In line with Hypothesis 2, participants also perceived the piece of music as less creative when it was labeled as AI-made (vs. human-made). The perceived creativity scores deviated to the left when the human-made piece was on the left (M = 43.15, SD = 21.77, 95% CI = [38.88, 47.43]) and to the right when the human-made piece was on the right (M = 57.02, SD = 21.09, 95% CI = [52.75, 61.29]), $F(1, 196) = 20.69$, $p < .001$, $\eta_p^2 = 0.10$. A mediation analysis (PROCESS model 4; Hayes, 2017) supported the proposed underlying mechanism (Hypothesis 3). The lower experience of awe in the case of AI-made (vs. human-made) music was explained by negatively biased creativity perceptions, indirect effect of B = 3.99, SE = 1.51, 95% CI = [1.46, 7.28], with an insignificant direct effect. In sum, results of Study 1 provide preliminary evidence that people are biased against AI-made art: They report experiencing less awe for it because they find it less creative than human-made art.

4. Study 2

Study 2 sought to replicate the effects of Study 1 (i.e., Hypotheses 1 and 2) in another artistic domain (painting) and to generalize the findings in a different population (UK community sample). The study design was the same as in Study 1. The only difference was that participants were now shown two paintings, which were in fact both human-made. Again, the identity of the creator (AI-made vs. human-made) was manipulated in counterbalanced order.

4.1. Methods

Participants were 298 UK residents (M_{age} = 35.07; 65.4% women) recruited online on Prolific in exchange for monetary compensation. We used exactly the same design, procedure, and measures as in Study 1. The only difference was that instead of listening to two pieces of music, participants now saw two paintings and were asked to rate those on awe (Cronbach's alpha = .76) and creativity (Cronbach's alpha = .67). The paintings we selected were from human artists: "Lonely Flower" by Paul Klee and "Upward" by Wassily Kandinsky . The presentation of the paintings, including the labels used ("human artist" vs. "AI artist"), closely resembled the presentation of stimuli in Study 1 (see Fig. 1). Given that we used other stimuli than in Study 1 (paintings instead of music) and participation took place online instead of in a controlled lab setting, we expected the effect size to be smaller. Since we did not know what effect size to expect, we targeted a sample size that was 50% larger than in Study 1. A sensitivity power analysis (α = .05, 80% power) showed that the smallest detectable effect size with the sample size used in the analyses was $f = 0.16$ ($\eta^2 = 0.03$).

4.2. Results

Consistent with the findings of Study 1, participants experienced less awe for the AI-made (vs. human-made) painting (Hypothesis 1). Their awe scores shifted to the left when the human-made painting was on the left (N = 149, M = 46.90, SD = 17.33, 95% CI = [44.10, 49.71]) and to the right when the human-made painting was on the right (N = 149, M = 51.65, SD = 17.85, 95% CI = [48.76, 54.54]), $F(1, 296) = 5.42$, $p = .021$, $\eta_p^2 = 0.02$. Moreover, participants perceived the AI-made painting as less creative than the human-made painting (Hypothesis 2). Their perceived creativity scores deviated to the left when the human-made painting was on the left (M = 40.33, SD = 19.57, 95% CI = [37.16, 43.50]) and to the right when the human-made painting was on the right (M = 55.92, SD = 18.72, 95% CI = [52.89, 58.95]), $F(1, 296) = 49.33$, $p < .001$, $\eta_p^2 = 0.14$. Perceived creativity mediated the effect of the creator (human vs. AI) on awe, indirect effect B = 4.15, SE = 1.17, 95% CI = [2.07, 6.62], with an insignificant direct effect (Hypothesis 3). In sum, Study 2 replicated the effects found in Study 1 in a different domain (painting) using stimuli that were actually human-made, speaking to the generalizability of the bias against AI-made art. However, since the effect of this study turns out to be smaller than the effect that could be detected with this sample size and 80% power, we ran an additional post-hoc power analysis, which suggests that a similar study with the currently observed effect size ($\eta_p^2 = 0.02$) and sample size would have a power of 69.08%.

5. Study 3

The aim of Study 3 was to replicate the effect of Study 3 with a larger sample size and to test whether the effect on awe would be more pronounced among individuals with stronger anthropocentric creativity beliefs (Hypothesis 5a). This study was conducted again in the domain of painting but with a different set of stimuli. To further enhance the generalizability of our findings, unlike the paintings of Study 2 that were both from human painters, in this study we included a new set of paintings as stimuli ("The beach at Pourville" and "Psychedelic") that were both made by an AI agent called AICAN (AICAN, 2020).

5.1. Method

Participants were 404 UK residents (M_{age} = 34.63; 52.6% women) recruited online on Prolific for monetary compensation. Sample size

estimation for Study 3 was based on an a priori power analysis (α = .05, 80% power) that showed that we would need to recruit 387 participants to detect a small effect ($\eta_p^2 = 0.02$; the effect size observed in Study 2). We aimed to recruit 5% more to account for those failing the attention check.

Participants were again shown two paintings, one labeled as AI-made and the other one as human-made. The presentation of the paintings, including the labels used ("human artist" vs. "AI artist"), closely resembled the presentation of stimuli in Study 1 and 2 (see Fig. 1). Both the order of the labels and the order of the two pieces of paintings were counterbalanced between subjects. Participants were asked to rate which painting they felt more awe for (Cronbach's alpha = .76). In addition, we measured anthropocentric creativity beliefs, that is the extent to which individuals believe that creativity is a uniquely human capacity that lies at the core of being human and distinguishes humans from other species. We developed the following 5-item scale (Cronbach's alpha = .82): "Creativity is a uniquely human characteristic," "Humans differentiate themselves from other species because of their ability to create," "Creativity is the essence of being human," "Creativity is at the core of being human," "Only humans have the ability to be creative" (1 = *strongly disagree*; 7 = *strongly agree*). The five items loaded on one factor explaining 59.12% of the total variance. The position of the moderator was counter-balanced across participants, either before or after the evaluation of the paintings.

5.2. Results

Replicating the findings of Studies 1 and 2, we found again a bias against AI-made art in terms of awe (Hypothesis 1). Participants deviated to the left when the human-made painting was on the left ($N = 203$, $M = 46.59$, $SD = 20.13$, 95% CI = [43.80, 49.37]) and to the right when the human-made painting was on the right ($N = 201$, $M = 52.26$, $SD = 19.44$, 95% CI = [49.56, 54.97]), $F(1,402) = 8.31$, $p = .004$, $\eta_p^2 = 0.02$. Moreover, in line with Hypothesis 5a, anthropocentric creativity beliefs moderated the effect on awe, $F(1, 400) = 4.39$, $p = .037$, $\eta_p^2 = 0.01$. To decompose the interaction effect, we conducted a spotlight analysis. Results of a spotlight analysis showed that the negative bias against AI-made art was present only among participants who scored high on anthropocentric creativity beliefs (1 SD above the mean; $M = 5.50$), $B = 9.87$, $SE = 2.78$, $p < .001$, but was absent among those scoring low on anthropocentric creativity beliefs (1 SD below the mean; $M = 3.12$), $B = 1.61$, $SE = 2.78$, $p = .56$. Furthermore, results of a floodlight analysis using the Johnson-Neyman technique (Spiller et al., 2013) revealed that this bias became statistically significant for values above 3.85 on the anthropocentric creativity beliefs scale (Fig. 2). These results suggest that the bias against AI-made art in terms of experienced awe is primarily driven by people who believe that creativity is a uniquely human characteristic.

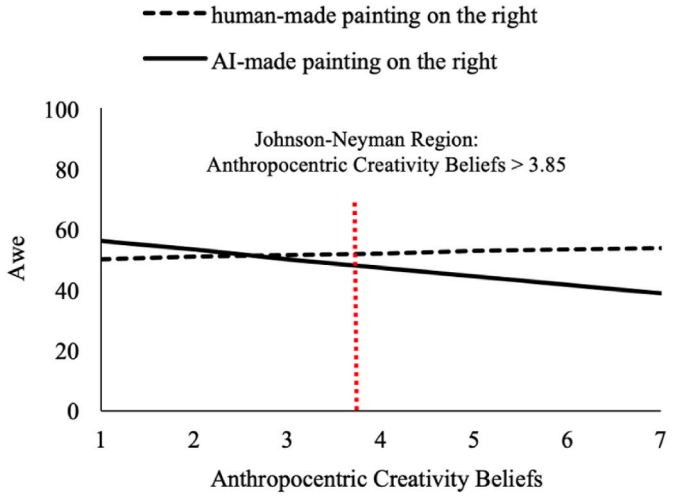

Fig. 2. Awe towards the painting on the right as a function of the manipulation (human-made vs. AI-made) and anthropocentric creativity beliefs in Study 3.

6. Study 4

Study 4 extends the findings of the previous studies in a number of substantial ways. First and foremost, we aimed at replicating all previous effects (Hypotheses 1–3 and 5a) in a single, high-powered preregistered study. Second, we additionally looked for downstream consequences of this bias against AI-made art in terms of preferences (Hypothesis 4). To this end, we also measured which one of the two artworks (AI-made or human-made) participants were willing to buy in a hypothetical decision. Third, to put all pieces of the puzzles together, we tested a comprehensive model summarizing all relationships hypothesized so far. Specifically, we predicted a serial mediation path from awe to perceived creativity and then to preference to buy (Hypothesis 6). In other words, we tested whether a work of art labeled as AI-made is perceived as less creative, which then induces less awe, and finally is preferred less than the same work of art labeled as human-made. Fourth, we examined whether anthropocentric creativity beliefs moderate a) each one of the above effects separately (awe, creativity, preference; Hypotheses 5a, 5b, and 5c respectively) and b) the entire serial mediation chain (creativity – awe – preference; Hypothesis 7). Finally, for generalizability purposes, we tested these hypotheses in a relatively new and highly popular artistic context, that of art reproductions (posters of artworks). All hypotheses, measures, manipulations, analytical plan, sample size estimations, and data exclusions have been preregistered (#67671).

6.1. Method

Participants were 800 UK residents ($M_{age} = 37.61$; 65.6% women) recruited online on Prolific for monetary compensation. Sample size estimation for this study was based on an a priori power analysis that showed that we would need to recruit 779 participants to detect a small effect ($\eta_p^2 = 0.01$) with an alpha of .05 and power of .80. We recruited 5% more (i.e., 817 participants in total) to account for those failing the attention check.

In this study, we used art reproductions (posters) as stimuli (adopted from Granulo et al., 2021), which are popular items people often buy. As in all previous studies, we manipulated the identity of the creator by randomly labeling either one of the two art reproductions as designed by a drawing robot or designed by a human painter (Fig. 3). We then assessed perceived creativity of the artwork (Cronbach's alpha = .86)

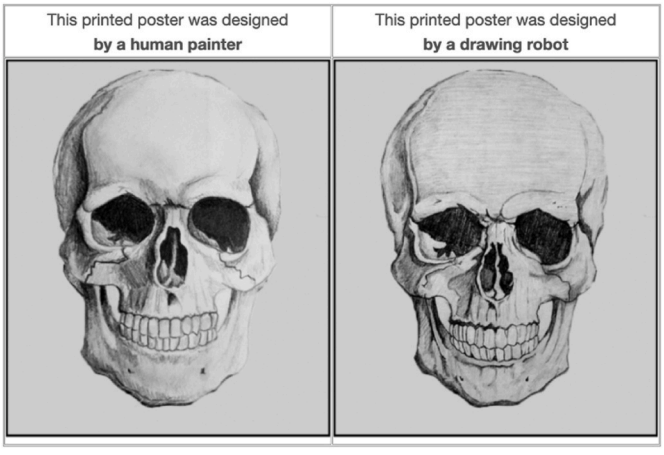

Fig. 3. Illustration of stimuli used in Study 4 (Adopted from Appendix of Granulo et al., 2021).

and felt awe (Cronbach's alpha = .92) with the same items as in all previous studies, although this time on 7-point scales. The only exception was the addition of the item "awe-inspiring" to the awe measure in order to enhance the face validity of the specific measure. Besides those two measures, we also measured preference to buy for either of the two art reproductions by asking participants to indicate which poster they would more likely buy to decorate their office (1 = *definitely the poster designed by a drawing robot*; 7 = *definitely the poster designed by a human painter*). Finally, we also assessed anthropocentric creativity beliefs with the same items as in Study 3 (Cronbach's alpha = .78). To improve data quality, we excluded 17 participants who failed an attention check question ("This item is to check if you read all statements. Please tick 'Strongly disagree'"). Excluding these participants did not change the results and conclusions. Again, all items loaded on one factor explaining 54.16% of the total variance supporting the unidimensionality of the scale.

6.2. Results

Consistent with Studies 1–3, we found again evidence for a bias against AI-made art in terms of awe (Hypothesis 1). Participants expressed less awe for the AI-made poster ($N = 401$, $M = 3.39$, $SD = 1.29$, 95% CI = [3.26, 3.52]) than for the human-made poster ($N = 399$, $M = 4.59$, $SD = 1.29$, 95% CI = [4.46, 4.72]) when both were displayed on the same (right) side, $F(1, 798) = 172.31$, $p < .001$, $\eta_p^2 = 0.18$. Bootstrap analyses (PROCESS model 1; Hayes, 2017) showed that this effect was moderated by anthropocentric creativity beliefs (Hypothesis 5a), $B = 0.47$, $SE = 0.08$, $p < .001$, $\eta_p^2 = 0.04$. Spotlight analyses showed that the negative bias against the AI-made poster in terms of awe was more pronounced among participants who scored high on anthropocentric creativity beliefs (1 SD above the mean; $M = 5.43$), $B = 1.71$, $SE = 0.13$, $p < .001$, than among those scoring low on anthropocentric creativity beliefs (1 SD below the mean; $M = 3.27$), $B = 0.69$, $SE = 0.13$, $p < .001$. Moreover, floodlight analyses showed that differences in experienced awe for the AI-made (vs. human-made) poster became significant for values of the moderator above 2.54 (Fig. 4).

Consistent with Studies 1–2, we also found evidence for a bias against AI-made art in terms of perceived creativity (Hypothesis 2). Participants perceived the AI-made poster ($M = 2.75$, $SD = 1.37$, 95% CI = [2.62, 2.89]) as less creative than the human-made poster ($M = 5.30$, $SD = 1.35$, 95% CI = [5.17, 5.44]) when both were displayed on the right side, $F(1, 798) = 705.61$, $p < .001$, $\eta_p^2 = 0.47$. This effect was moderated by anthropocentric creativity beliefs (Hypothesis 5b), $B = 0.62$, $SE = 0.09$, $p < .001$, $\eta_p^2 = 0.06$. Spotlight analyses demonstrated that the negative bias against the AI-made poster in terms of creativity was more pronounced among participants high rather than low on anthropocentric creativity beliefs, $B = 3.21$, $SE = 0.13$, $p < .001$, and $B = 1.89$, $SE = 0.13$, $p < .001$, respectively. Floodlight analyses further showed that differences in creativity perceptions of the AI-made (vs. human-made) poster became statistically significant for values above 1.14 of the moderator (Fig. 5).

In addition, we also found evidence for a bias against AI-made art in terms of preferences (Hypothesis 4). Participants indicated they would be less likely to buy the AI-made poster ($M = 3.02$, $SD = 2.08$, 95% CI = [2.82, 3.23]) than the human-made poster ($M = 4.85$, $SD = 2.12$, 95% CI = [4.64, 5.06]) when both were displayed on the right side, $F(1, 798) = 150.84$, $p < .001$, $\eta_p^2 = 0.16$. This effect was moderated by anthropocentric creativity beliefs (Hypothesis 5c), $B = 0.76$, $SE = 0.14$, $p < .001$, $\eta_p^2 = 0.04$. Spotlight analyses revealed that the negative bias against the AI-made poster in terms of preference to buy was more pronounced among participants high rather than low on anthropocentric creativity beliefs, $B = 2.65$, $SE = 0.21$, $p < .001$, and $B = 1.01$, $SE = 0.21$, $p < .001$, respectively. Moreover, floodlight analyses showed that differences in preference to buy for the AI-made (vs. human-made) poster became statistically significant for values above 2.65 of the moderator (Fig. 6).

To test the complete model (Hypothesis 6), we conducted a serial mediation analysis (PROCESS model 6; Hayes, 2017) with position of the human-made poster (left vs. right) as independent variable, preference to buy (for the poster displayed on the right) as dependent variable, and creativity and awe as serial mediators (mediator 1 and mediator 2 respectively). Results confirmed that the hypothesized indirect effect (creativity – awe – preference) was statistically significant, $B = 1.36$, $SE = 0.11$, 95% CI = [1.14, 1.59], with an insignificant direct effect. This means that an AI-made (vs. human-made) poster was perceived as less creative, which in turn induced less awe and finally resulted in lower preference to buy (Fig. 7).

Finally, to test whether this serial mediation model was moderated by anthropocentric creativity beliefs (Hypothesis 7), we conducted a moderated serial mediation analysis (PROCESS model 85; Hayes, 2017) with position of the human-made poster (left vs. right) as independent variable, preference to buy (for the poster displayed on the right) as dependent variable, creativity and awe as serial mediators (mediator 1 and mediator 2 respectively), and anthropocentric creativity beliefs as moderator. In line with the hypothesis, the index of moderated serial mediation was significant, $B = 0.08$, $SE = 0.03$, 95% CI = [0.02, 0.15], indicating that the serial mediation effect described above held more for

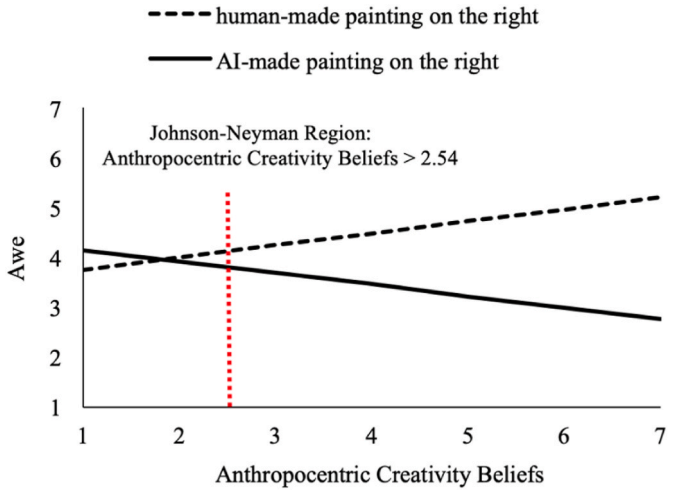

Fig. 4. Awe towards the painting on the right as a function of the manipulation (human-made vs. AI-made) and anthropocentric creativity beliefs in Study 4.

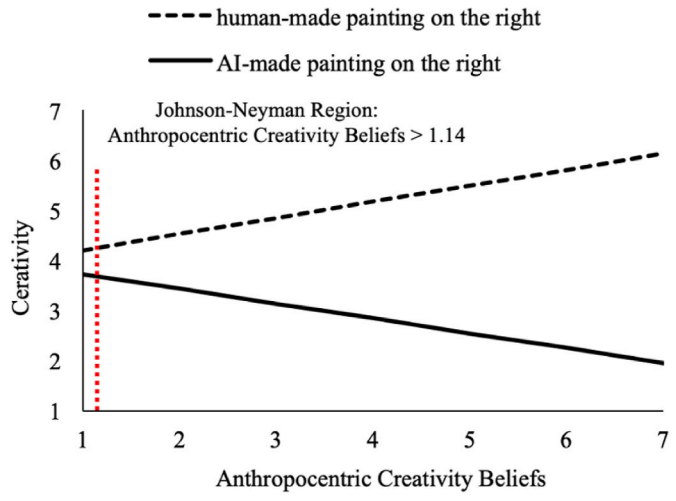

Fig. 5. Creativity ratings of the painting on the right as a function of the manipulation (human-made vs. AI-made) and anthropocentric creativity beliefs in Study 4.

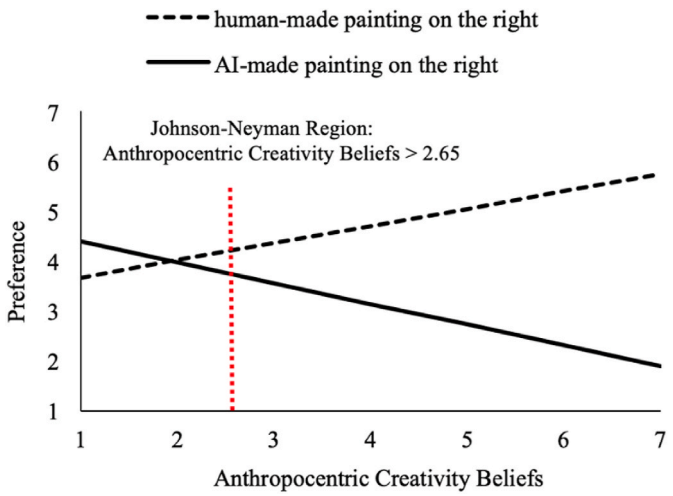

Fig. 6. Preference to buy for the painting on the right as a function of the manipulation (human-made vs. AI-made) and anthropocentric creativity beliefs in Study 4.

people with stronger anthropocentric creativity beliefs.

7. General discussion

Results of four experiments (including one large-scale preregistered experiment comprehensively testing all hypotheses) show that people display a negative bias against AI-made art across various forms of art. Merely labeling a work of art as AI-made (vs. human-made) is enough to shift people's preferences toward the human-made one. Going beyond prior research on algorithm aversion and AI acceptance (Castelo et al., 2019; Dietvorst et al., 2015; Granulo et al., 2021), the findings reveal that the bias against AI extends to the field of artistic creation, one of the last frontiers of anthropocentrism that has been untouched by AI until recently. This bias is expressed both in a cognitive (reduced perception of creativity) and emotional (reduced experience of awe) manner, while the former accounts for the effect on the latter. This suggests assigning lower creative value to AI art results in more restricted emotional responses in terms of awe. Importantly, these effects are more pronounced for people who endorse anthropocentric creativity beliefs more strongly. People's belief that only humans can be creative biases their perception of how creative AI art can be and subsequently contaminates their emotional responses to this art. This supports our theorizing that the basis of this bias is motivated reasoning and specifically a desire to guard human precedence in the domain of creativity. This finding extends prior research on the moderating role of need for uniqueness in the acceptance of AI in symbolic domains (Granulo et al., 2021) and suggests that people's responses to AI are not only determined by inferred uniqueness of AI-made products but also by assumptions about human uniqueness itself.

Our research contributes to the literature on speciesism and anthropocentrism (Fortuna et al., 2021; Schmitt, 2020) by revealing a novel pervasive human bias that has evolved in response to current technological advances challenging humans' worldviews, while it also provides novel insights into the societal impact of AI (Köbis et al., 2021). It also converges with classical work on rationalization processes (Festinger, 1957), motivated reasoning (Kunda, 1990), and social representations (Moscovici, 1961) and furnishes valuable insights into people's understanding of – and efforts to defend their understanding of – human nature. More broadly, it appears that people's assessments of objects often reveal more about people's belief systems than about external objects per se. For example, similar to the tradition of social representations research (Farr, 1998; Jodelet, 1991; Moscovici, 1961), people's responses to AI art seem to serve as reinforcements of their own system of values, ideas and practices that help them maintain cherished anthropocentric worldviews, navigate the social world in a way that perpetuates human supremacy, and establish a code of communication centered around shared assumptions about what it means to be human. By seeing less creative value in, feeling less awe for, and showing lower preference to buy for AI-generated art, people inadvertently reveal their need to support anthropocentrism in the face of recent advances of AI that threaten the last fortress of human supremacy arguments, artistic creation.

Our work poses various intriguing questions for future research. First of all, how can artistic creativity of AI agents be judged in an unbiased manner? The findings show that participants who view creativity as an exclusively human attribute deny the creative value of AI art and thereby feel less awe for it. This is made possible because creativity assessments are characterized by a wide latitude within which they can range. However, this is not without problems from a formal logic standpoint. People argue that AI art is not as creative as human art because only humans can be creative. This circular logic and lack of unambiguous criteria in defining the essence and value of creativity enables people to enter a vicious circle of eternally refuting AI the capability of being truly creative. Current work in computational creativity undertakes the difficult task of working out clearer criteria for the assessment of creativity of AI systems (e.g., Arriagada, 2020; Jordanous, 2012). This work tries to demystify the creation process and strip creativity judgments of its biased and tautological nature. Other research has also provided insights into the underpinnings of objectivity in taste judgments (Spiller & Belogolova, 2017). Future research could try to disseminate the results of these scientific endeavors more widely to the public or even better translate them into practical interventions that could debias people's perceptions of AI art.

But why does it matter to debias people's perceptions of AI art? Besides it being a purely philosophical exercise of accessing things at their true form, the ability to enjoy AI art free from prejudice and preconceptions can have some pragmatic consequences. First, people's tendency to treat AI artwork differently from human artwork might negatively impact the future of technological advances in the field of AI. For example, computer scientists and organizations alike might refrain from investing in related technological innovation if people are not willing to give AI-generated art a chance. Second, people's tendency to impose restrictions on their thinking, feeling and action when they knowingly interact with an AI-generated artwork might be considered to

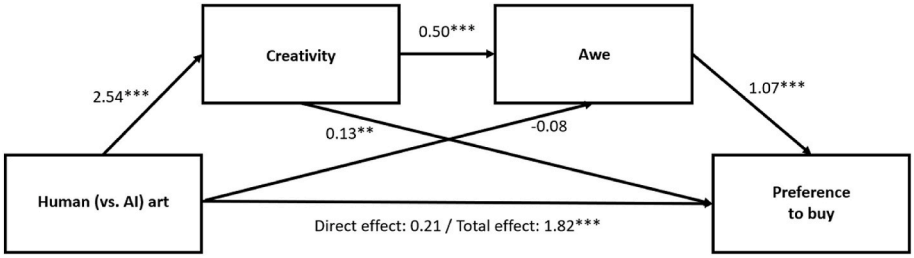

Fig. 7. Indirect effect of human (vs. AI) art on preference to buy via perceived creativity and experienced awe (serial mediation analysis).

some extent unethical or at least improper. Although it might come across as unearthly to raise ethical issues of discrimination against AI at this stage, it is certainly the case that underappreciation of AI art based on anthropocentric beliefs implies that people are blind to ample scientific evidence questioning the prioritization of humans over other species. Thus, debiasing the public's perception of AI art can serve a higher-order educational role and help promote a new and more nuanced vision of humanity that is better suited to the zeitgeist of the 21st century and is more solidly rooted in contemporary scientific advances. Finally, letting anthropocentric biases taint people's art appreciation represents a missed opportunity to have yet one more rewarding artistic experience. By fighting their anthropocentric biases and openly appreciating AI art, people allow themselves to expand their enjoyment of art products.

One limitation of our work is that it is agnostic to the reasons why people with stronger anthropocentric creativity beliefs derogate AI-made art more. For instance, they might believe that AI cannot be creative because it lacks bodily experiences or corporeal sentience that are essential for the creative process, or they might believe that AI cannot be creative because AI lacks dreams, goals and aspirations. Future research could try to locate the exact basis of anthropocentric beliefs in the domain of creativity where bias against AI comes from. Another limitation concerns the populations used in our studies. As our participants came from Western, wealthy and industrialized countries, it remains unclear to what extent these findings generalize to other populations and parts of the world. Individual-level variables like educational attainment and technological affinity or country-level variables like degree of digitalization might affect people's anthropocentric beliefs and thereby shape their responses to AI art. Whereas this remains an open question, we believe that our findings provide a rather conservative test of our hypotheses in the sense that if bias against AI art is evidenced in Western, industrialized countries and among young, educated University students that can be considered digital natives, the proposed effects should only be stronger in less industrialized countries or among less educated and technology-affine participants.

Other limitations of our work lie in the specific setup of our experiments. First, we examined relative preferences for AI-made vs. human-made art by making use of a within subjects design. One may therefore argue that the bias is driven by demand effects (i.e., participants may have guessed the hypothesis that people will express more awe for human-made than AI-made work and therefore answered in line with this research hypothesis). However, the moderation effects in Studies 3 and 4 (i.e., the fact that the main effect, as shown in Studies 1 and 2, is moderated by anthropocentric creativity beliefs) are hard to reconcile with a demand-effects interpretation. Second, although we focused on the emotion of awe since it has been considered to be the primary emotional reaction to art (Fingerhut & Prinz, 2018), people also have other aesthetic emotions and experiences. For instance, it remains to be tested if people are more fascinated or touched by human-made than AI-made art, and to what extent aesthetic pleasure may differ across both forms of art. Therefore, future research may examine which aesthetic experiences are biased towards human-made art and which not, and to what extent anthropocentric creativity beliefs matter for these different aesthetic experiences.

To conclude, the present work suggests a systematic depreciation of AI-made art to serve a shaken anthropocentric worldview whereby creativity is exclusively reserved for humans. We believe that this bias, besides revealing important aspects of humans' anthropocentric beliefs, can also have profound practical implications for the acceptance and appreciation of AI art specifically as well as for the future of human-machine interaction more broadly.

Author statement

K.M, F.B., G.D. and M.K. were all involved in (at least part of the) conceptualization and designed (one or more of) the studies. F.B. and G. D. carried out the experiments. F.B. and G.D. analysed the data. G.D. took care of data curation. M.K. wrote the first draft of the paper and K. M, F.B., G.D. provided critical input and revisions.

Declaration of competing interest

None.

Data availability

Data are accesible by everyone: We have shared the link to our data on ResearchBox in the main text of the paper

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