JCP JOURNAL OF CONSUMER PSYCHOLOGY

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Preference for human (vs. robotic) labor is stronger in symbolic consumption contexts

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Accepted by Priya Raghubir, Editor; Associate Editor, Maureen (Mimi) Morrin

Abstract

Advances in robotics, automation, and artificial intelligence increasingly enable firms to replace human labor with technology, thereby fundamentally transforming how goods and services are produced. From both managerial and societal points of view, it is therefore important to understand demand-side incentives for firms to employ human labor. We begin to address this question by examining for which products and services consumers are more likely to favor human (vs. robotic) labor. In six studies, we demonstrate that consumers prefer human (vs. robotic) labor more for products with higher (vs. lower) symbolic value (e.g., when expressing something about one's beliefs and personality is of greater importance). We theorize that this is because consumers have stronger uniqueness motives in more (vs. less) symbolic consumption contexts (and associate human labor more strongly with product uniqueness). In line with this account, we demonstrate that individual differences in need for uniqueness moderate the interaction between production mode and symbolic motives and that a measure of uniqueness motives mediates the effect of consumption context on preferences for human (vs. robotic) production.

Keywords Consumer preferences; Human labor; Robotic labor; Symbolic consumption; Uniqueness motives

Advances in robotics and artificial intelligence are transforming the economy. Labor that used to be done exclusively by humans is shifting to machines, robots, and algorithms (Brynjolfsson & McAfee, 2014). The consequences of these developments for the demand for human labor are hotly debated in academia and popular press, with, for example, *Nature* urging scientists to develop a better understanding of how "technology is transforming work" (Mitchell & Brynjolfsson, 2017) and *The Economist* announcing the "march of the machines" (2016). The debate has been most intense within economics, with a focus on when human labor is more likely to be automated (Autor, Levy, & Murnane, 2003; Brynjolfsson, Mitchell, & Rock, 2018). While robots and algorithms are transforming consumer–firm interactions in many industries, consumer research provides little insight into how consumers react to today's robotic revolution (Granulo, Fuchs, & Puntoni, 2019). This topic is important because demand-side factors may offer incentives for firms to maintain human labor in production activities that could otherwise be automated.

We examine relative preferences for human versus robotic labor. We demonstrate that consumers have stronger preferences for human labor, relative to robotic labor, in the case of products, services, or product features with higher symbolic value. We theorize that human (vs. robotic) labor helps consumers satisfy uniqueness motives (Lynn & Snyder, 2002), which are more important in more symbolic consumption contexts (Berger & Heath, 2007). Supporting this account, greater preference for human (vs. robotic) labor in more symbolic consumption contexts is moderated by consumers' need for uniqueness and mediated by uniqueness motives, controlling for alternative accounts (e.g., love and product quality). Moreover, this effect is observed even when a product is

Received 6 March 2019; accepted 13 July 2020
Available online 18 July 2020
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1057-7408/2020/1532-7663
DOI: 10.1002/jcpy.1181

designed but not produced (or touched) by humans, further differentiating our findings from research on handmade products (Fuchs, Schreier, & van Osselaer, 2015).

Theory

Prior literature documents reactance against autonomous technologies (e.g., Leung, Paolacci, & Puntoni, 2018; Longoni, Bonezzi, & Morewedge, 2019; Mende, Scott, van Doorn, Grewal, & Shanks, 2019) but also situations where consumers do not prefer humans to algorithms (e.g., Castelo, Bos, & Lehmann, 2019; Logg, Minson, & Moore, 2019). This highlights the need for researchers to investigate the triggers of consumer preference for human versus robotic labor. We examine this timely question by focusing on a broad, yet important, product dimension: symbolic value.

Consumption is often symbolic. Individuals can experience being a particular type of person by consuming products that connote abstract concepts such as values, abilities, group memberships, and more. Products vary in the extent they provide symbolic value (e.g., Belk, 1988; Reed, Forehand, Puntoni, & Warlop, 2012; Solomon, 1983), with some more suitable (e.g., clothing) than others (e.g., tools). Even consumption of the same product can be differentially symbolic depending on the situation (e.g., biking to work to avoid traffic versus for leisure; Leung et al., 2018). We compare whether consumer preferences for human versus robotic labor vary across consumption contexts with higher (e.g., when expressing something about oneself is important) versus lower symbolic value (e.g., when the instrumentality of product attributes is important; Green & Blair, 1995).

We predict that relative preferences for human (vs. robotic) labor are stronger for more symbolic products and product components, or in contexts where symbolic value is more important. We theorize that this preference occurs because human (vs. robotic) labor helps consumers satisfy uniqueness motives, which are more important in symbolic consumption. Uniqueness motives—the desire to purchase more differentiated and scarce products (Lynn & Snyder, 2002)—depend not only on the person (Tian, Bearden, & Hunter, 2001), but also on the symbolic meaning of the products (Berger & Heath, 2008; Chan, Berger, & Van Boven, 2012; White & Dahl, 2006). Consumers value self-expressive products more when they have a high need for uniqueness (Tian et al., 2001), are more likely to diverge from majorities in identity-relevant domains (Berger & Heath, 2007), and value unique products more when they aim to express aspects of their self (Lynn, 1991; Mazodier & Merunka, 2014; Tian & McKenzie, 2001). Prior research therefore documents stronger uniqueness motives when consumption is more symbolic. We add to this literature by proposing that, in symbolic consumption contexts, uniqueness motives increase preferences for human (vs. robotic) labor. This is because consumers should associate human (vs. robotic) production more strongly with uniqueness. A hallmark of robotic labor is reliability and consistency, which should lead to identical products (Liebl & Roy, 2003). In contrast, human labor should lead to more unique and varied products. For example, human labor might create variations that do not affect overall quality but that prevent products from being exact replicates; or human labor might imbue products with a special essence (cf., Huang, Ackerman, & Newman, 2017; Morales, Dahl, & Argo, 2018). While pinpointing these different processes lies outside the scope of this research report, we argue that, compared to robotic labor, human labor makes products better suited to satisfy uniqueness motives. In sum, we propose that in more symbolic consumption contexts, consumers have stronger uniqueness motives, which increases preferences for human (vs. robotic) labor. We test these predictions in four experiments.

Study 1

Study 1 tests our main prediction of increased demand for products created by humans (vs. robots) in more symbolic consumption contexts. We do so in the context of tattoos, building on the fact that *getting* a tattoo provides higher symbolic value than *removing* one. A pretest ($N = 42$, 29 female, $M_{age} = 22.81$, students) confirmed that getting a tattoo is perceived as having higher symbolic value than removing one ($M_{get\ tattoo} = 5.91$, $SD = 0.30$ versus $M_{remove\ tattoo} = 2.62$, $SD = 1.78$, $t(41) = 11.93$, $p < .01$; see Methodological Detail Appendix [MDA] for details regarding all studies' stimuli, measures, and pretests).

Participants ($N = 144$, 63 female, $M_{age} = 20.37$, students) were randomly assigned to one of two conditions (service: high versus low symbolic value; between participants). In the high symbolic value condition, participants were asked to consider that they wanted to get a new tattoo and had chosen their tattoo motif and gone to the tattoo studio. At this studio, they had the option to get their tattoo by a tattooist or by a modern robot (supervised by a

tattooist). In the low symbolic value condition, participants were asked to imagine that they wanted to remove a tattoo and went to a clinic. At this clinic, they had the option to have their tattoo removed by a doctor or by a modern robot (supervised by a doctor). In both conditions, participants were told that previous experiences have shown that both options yield identical results. Our dependent variable was preference (1 = by a tattooist [doctor], 6 = by a robot), recoded such that higher values indicate a higher preference for human labor.

Participants had a higher preference for human than robotic labor in the high (M_{high} = 5.03, SD = 1.45) versus low symbolic value condition (M_{low} = 4.03, SD = 1.82, $t(142) = 3.65$, $p < .01$), albeit both means were higher than the scale midpoint indicating preference for human labor ($t(71)_{3.5} = 8.92$ and 2.47, respectively, ps < .05). These results, which we replicated with a between-participants manipulation of the service provider (see MDA), suggest preferences for human (vs. robotic) labor are greater for tasks with more (vs. less) symbolic value. In the following studies, we test whether, as we have argued, this greater preference is driven by uniqueness motives or whether it can be explained by competing accounts: namely, positive effects of handmade production (Fuchs et al., 2015; Study 2), love, product quality, product importance, and how products are typically produced (Study 4).

Study 2

Study 2 aims to replicate our previous findings, keeping the product constant and manipulating the consumption context (more vs. less symbolic). Moreover, we use a context where the product is designed by a human (vs. algorithm) but manufactured by machines, to distinguish our findings from positive effects of handmade production (Fuchs et al., 2015). Thus, we test whether the effect obtains when producers have no physical contact with the product.

Method

Participants (N = 322, 161 female, M_{age} = 37.42, MTurk) were randomly assigned to one of four conditions in a 2 (design: human vs. algorithm) × 2 (consumption context: more vs. less symbolic) between-participants design. Participants were asked to imagine working as a medical doctor and wanting a printed (therefore, not handmade) poster of a skull for their office. Participants in the more symbolic consumption context condition read that they wanted the printed poster to "improve the interior design of the room." Participants in the less symbolic consumption context condition read that they wanted the printed poster to "explain anatomical details to your patients." Next, participants were shown two posters with the drawing of a human skull, displayed next to each other (their position was held constant across conditions). In the human (algorithm) design condition, the printed poster on the right was designed by a human (algorithm) and the printed poster on the left by an algorithm (human). Participants were asked which of the two posters they would be more likely to buy (1 = skull on the left, 7 = skull on the right).

Results

A 2 × 2 ANOVA on buying intentions revealed a significant main effect of design (M_{human} = 4.35, SD = 2.12 vs. $M_{algorithm}$ = 2.78, SD = 1.99, $F(1, 318) = 47.79$, $p < .01$), qualified by a significant interaction ($F(1, 318) = 5.20$, $p < .05$); the main effect of consumption context was marginally significant (M_{high} = 3.35, SD = 2.16 vs. M_{low} = 3.78, SD = 2.23, $F(1, 318) = 3.61$, $p < .10$). Participants preferred the printed poster on the right more when it was designed by a human (vs. algorithm). This preference was stronger when the consumption context was more symbolic (i.e., decorate; M_{human} = 4.39, SD = 2.00 vs. $M_{algorithm}$ = 2.31, SD = 1.79, $F(1, 318) = 43.07$, $p < .01$) than when it was less symbolic (i.e., educate; M_{human} = 4.30, SD = 2.26 vs. $M_{algorithm}$ = 3.25, SD = 2.08, $F(1, 318) = 10.53$, $p < .01$; see Figure 1). These results corroborate our main hypothesis in a context without handmade production.

Comparing the more (vs. less) symbolic consumption contexts, preferences for the printed poster on the right were not significantly different when the poster was designed by a human ($M_{\text{more symbolic}}$ = 4.39, SD = 2.00 vs. $M_{\text{less symbolic}}$ = 4.30, SD = 2.26, $F(1, 318) = 0.07$, $p = .79$), but were significantly lower when the poster was designed by an algorithm ($M_{\text{more symbolic}}$ = 2.31, SD = 1.79 vs. $M_{\text{less symbolic}}$ = 3.25, SD = 2.08, $F(1, 318) = 8.74$, $p < .01$). In line with our theorizing that robotic labor should be less suited to satisfy uniqueness motives, this pattern indicates that consumers dislike robotic production for symbolic products.

Study 3

Study 3 aims to replicate the results of Study 2 and test moderation by individual differences in need

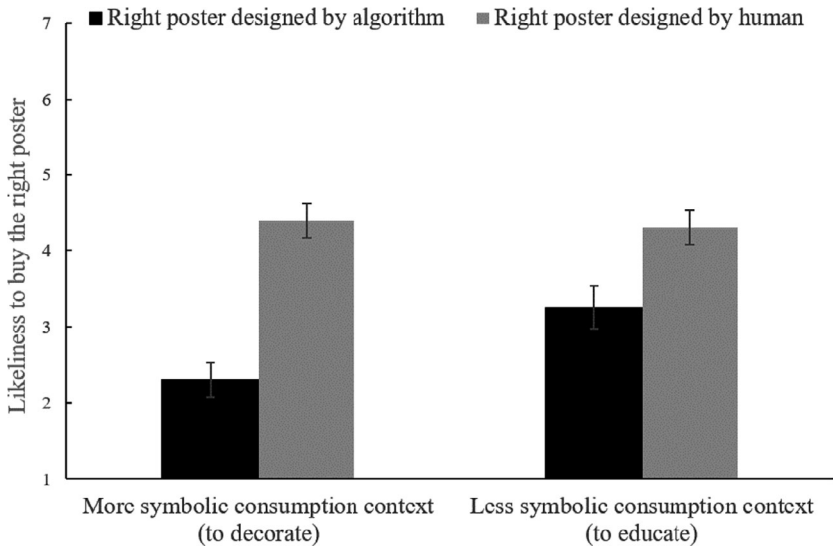

FIGURE 1. Comparison of the average likeliness to buy the left (=1) versus the right (= 7) printed poster (±SE) across the different conditions (Study 2).

for uniqueness. We argued that uniqueness motives are an important element in explaining preferences for human (vs. robotic) labor for more symbolic products. If so, the production mode by symbolic value interaction should be stronger among consumers higher in need for uniqueness, who should be more sensitive to situationally relevant cues for uniqueness (Tian et al., 2001).

Method

Participants (N = 402, 175 female, M_{age} = 37.23, MTurk) were randomly assigned to one of four conditions in a 2 (production: human vs. robotic) x 2 (consumption context: more vs. less symbolic) between-participants design. We also measured individual differences in need for uniqueness as an additional predictor. The stimuli and text were similar to those in Study 2. In the more symbolic consumption context condition, participants read that they wanted a poster to decorate the office, whereas in the less symbolic consumption context condition, they wanted it to educate patients. Participants were exposed to the same pictures of a skull from Study 2. In the human production condition, participants were informed that the poster on the right was drawn by a human painter and that on the left by a drawing robot. In the robotic production condition, the same pictures were described in the opposite way. Next, participants indicated which poster they would be more likely to buy, the one by a drawing robot or by a human painter (1 = skull on the left, 7 = skull on the right), and completed an 11-item need for uniqueness scale (1 = strongly disagree, 5 = strongly agree; α = 0.98; Tian & McKenzie, 2001).

Results

We regressed buying intentions on the two experimental factors, need for uniqueness (mean-centered) and their respective interactions as predictors (see Table 1). Consistent with our previous results, participants preferred the poster on the right more when it was drawn by a human (vs. robot; b = 1.04, $t(394)$ = 3.58, $p < .01$; 95% CI (0.47, 1.62)) and this main effect of production was qualified by the two-way interaction with consumption context (b = 1.28, $t(394)$ = 3.09, $p < .01$; 95% CI (0.47, 2.10)). The preference for the right poster drawn by a human (vs. robot) was stronger when the consumption context was more symbolic (i.e., decorate; M_{human} = 4.79, SD = 2.24 vs. M_{robot} = 2.47, SD = 1.90, $F(1, 398)$ = 60.27, $p < .01$) than when it was less symbolic (i.e., educate; M_{human} = 3.84, SD = 2.20 vs. M_{robot} = 2.83, SD = 2.06, $F(1, 398)$ = 11.71, $p < .01$).

Crucially, need for uniqueness interacted significantly with the two experimental factors (three-way interaction: b = 0.72, $t(394)$ = 2.08, $p < .05$; 95% CI (0.04, 1.41)). As predicted, the higher participants' need for uniqueness is, the more strongly the participants preferred the poster drawn by a human (vs. robot) in the more symbolic consumption context. The upper panel of Figure 2 plots the conditional two-way interaction between production mode and symbolic value across different levels of need for uniqueness: The positive effect of human

(vs. robotic) production for more symbolic consumption contexts (y-axis) becomes stronger when need for uniqueness (x-axis) is higher. Following Gelman and Park (2009), the lower panel of Figure 2 shows that the interaction between production mode and symbolic value is significant for participants high in need for uniqueness ($F(1, 136) = 10.31$, $p < .01$), but not for those low in need for uniqueness ($F(1, 126) = 0.48$, $p = .49$).

Study 4

Study 4 examines the context of products where some components provide more symbolic value than others. Consumers should prefer human (vs. robotic) production more for more symbolic product components. Moreover, we test whether relative preferences for human (vs. robotic) labor in the case of more symbolic product components are mediated by uniqueness motives. If, as we argued, human labor is in general more strongly associated with product uniqueness than machine labor, human labor should help satisfy uniqueness motives, which should be stronger in the case of symbolic product features. Therefore, we hypothesized that uniqueness motives are stronger for more (vs. less) symbolic product components and drive relative preferences for human (vs. robotic) labor. In addition to testing this reasoning, we examine competing accounts (e.g., love, product quality). We test these predictions in the contexts of eyeglasses; the frame of eyeglasses, typically a vehicle for self-expression, tends to provide more symbolic value than the lenses. A pretest ($N = 42$, 29 female, $M_{age} = 22.81$, students) confirmed that a frame is perceived as a more symbolic product component than lenses ($M_{frame} = 4.21$, $SD = 1.37$ vs. $M_{lenses} = 1.45$, $SD = 0.77$, $t(41) = 11.97$, $p < .01$).

TABLE 1
Regression analysis Study 3.

	Dependent Variable Likelihood to buy the right poster
Production	1.04**
	(0.29)
Consumption context	−0.35
	(0.29)
Need for uniqueness[a,*]	0.46*
	(0.19)
Production × consumption context	1.28**
	(0.41)
Production × need for uniqueness	−0.21
	(0.26)
Consumption × need for uniqueness	−0.49
	(0.26)
Production × consumption × need for uniqueness	0.72*
	(0.35)
Intercept	2.83**
	(0.21)
Observations	402
R-squared	0.19

Note. OLS regressions with standard errors in parentheses.
[a]Mean-centered
*$p < .05$.
**$p < .01$.

Method

Participants ($N = 201$, 130 female, $M_{age} = 35.09$, Prolific) were randomly assigned to one of two conditions (product component: more vs. less symbolic; between participants). In the more (vs. less) symbolic product component condition, participants read that they were looking for a new frame (vs. lenses) for their eyeglasses and therefore went to a store offering many types of frames (vs. lenses). They were shown pictures of different frames (vs. lenses) as examples. Next, participants read that, after trying out a number of frames (vs. lenses), they found a frame (vs. lenses) that perfectly suits them. They were told of two different ways the frame (vs. lenses) can be produced: by robots or by humans. Participants read that the frame (vs. lenses) would cost the same regardless. Our dependent variable was preference for production mode (1 = by a robot, 6 = by a human).

We assessed uniqueness motives as our process variable on a 7-point uniqueness scale ("I want the frame (vs. lenses) of my eyeglasses to be. . ." "original," "uncommon," "special," "atypical"; $\alpha = 0.94$; Fuchs and Diamantopoulos (2012)). A pretest ($N = 80$, $M_{age} = 36.00$) confirmed our theorizing that human (vs. robotic) labor is in general more strongly associated with product uniqueness ($M_{frames} = 5.33$, $SD = 1.20$, $t(79)_4 = 9.84$, $p < .01$; $M_{lenses} = 4.99$, $SD = 1.40$, $t(79)_4 = 6.34$, $p < .01$).

We also measured other factors potentially driving preferences for human (vs. robotic) production, including love (e.g., "The frame (vs. lenses) of my eyeglasses should be full of love"; $\alpha = 0.94$; Fuchs et al., 2015), product quality ("The frame (vs. lenses) of my eyeglasses should be of high-quality"), component importance ("If you were looking for new eyeglasses, how important would the frame (vs. lenses) be to you?"), and whether frames

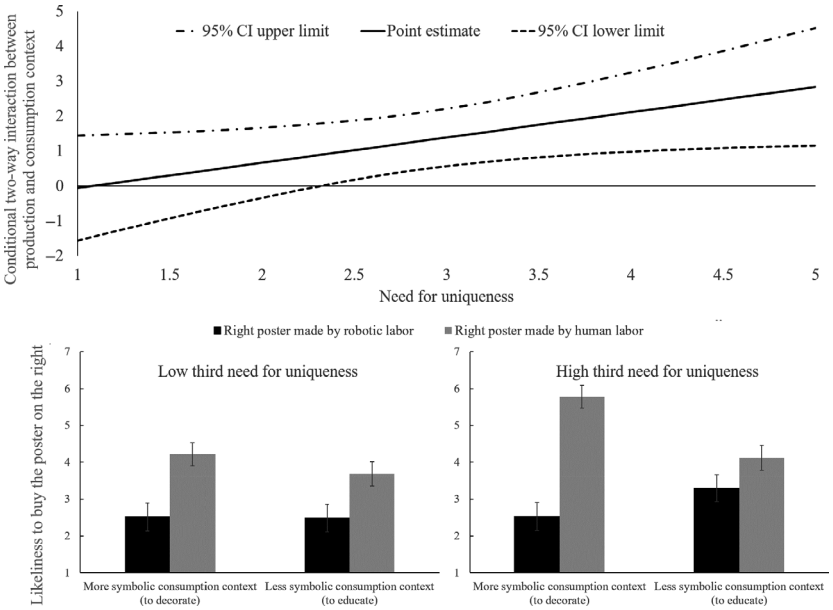

FIGURE 2. Upper panel: conditional two-way interaction between production and consumption context as a function of need for uniqueness (Study 3). Lower panel: comparison of the average likeliness to buy the left (=1) versus the right (= 7) printed poster (±SE) for participants with a high (vs. low) need for uniqueness. The high (vs. low) category was defined as those participants whose need for uniqueness was greater than the 66% percentile (vs. below or equal to the 33% percentile; Gelman & Park, 2009) (Study 3).

(vs. lenses) are typically manufactured using robotic or human production (see MDA).

Results

Participants displayed stronger preferences for human (vs. robotic) labor when they aimed to purchase a more symbolic product component (i.e., frame) than a less symbolic one (i.e., lenses; $M_{more\ symbolic} = 4.47$, $SD = 1.69$ vs. $M_{less\ symbolic} = 3.69$, $SD = 1.90$, $t(199) = 3.09$, $p < .01$). Specifically, participants preferred human to robotic production for a frame ($M_{more\ symbolic} = 4.47$, $t(101)_{3.5} = 5.81$, $p < .01$), but were indifferent between human and robotic production for lenses ($M_{less\ symbolic} = 3.69$, $t(98)_{3.5} = 0.98$, $p = .33$).

Next, we tested whether the effect of the symbolic value of product component (explanatory variable) on preferences for human (vs. robotic) production (dependent variable) is simultaneously mediated by uniqueness motives (mediator), as well as love, quality, importance, and perceptions of current manufacturing procedures (alternative mediators). The multiple mediation model (based on 10,000 bootstrap samples) revealed that only the indirect effect through uniqueness was significant ($b = 0.22$, $SE = 0.09$; 95% CI (0.07, 0.42); the confidence interval does *not* contain *zero*, see Figure 3). That is, participants wanted a product component with higher symbolic value (i.e., frame) to be significantly more unique than a product component with lower symbolic value (i.e., lenses; $M_{more\ symbolic} = 4.03$, $SD = 1.72$ vs. $M_{less\ symbolic} = 3.26$, $SD = 1.74$, $t(199) = 3.17$, $p < .01$), which in turn drove participants' preferences for human (vs. robotic) production. The indirect effects through love ($b = 0.01$, $SE = 0.02$; 95% CI (−0.04, 0.06)), quality ($b = 0.04$, $SE = 0.11$; 95% CI (−0.16, 0.26)), importance ($b = 0.01$, $SE = 0.03$; 95% CI (−0.04, 0.07)), and manufacturing procedures ($b = 0.02$, $SE = 0.07$; 95% CI (−0.12, 0.16)) were not significant. These results suggest that consumers value human (vs. robotic) labor more in more (vs. less) symbolic contexts because in these contexts they are motivated to acquire more unique products, controlling for serval alternative mechanisms. One limitation of this study is that we did not measure precision as a mediator variable; we will return to this issue in the General Discussion.

GENERAL DISCUSSION

Four studies demonstrate that consumers prefer human (vs. robotic) labor more in more (vs. less) symbolic consumption contexts. By doing so, we complement the supply-side perspective in the economics literature (for which tasks human labor is

less efficient than robotic labor) with a demand-side perspective (for which products human labor creates more value for consumers than robotic labor), adding a new layer to an important managerial and policy discussion. We argued that an important driver of this relative preference is that human (vs. robotic) labor helps consumers to satisfy uniqueness motives, which are more important in symbolic consumption contexts. In line with this theorizing, greater preference for human (vs. robotic) labor in more symbolic consumption domains was moderated by consumers' need for uniqueness and mediated by uniqueness motives, controlling for various other potential explanations.

The present work extends prior findings that consumers prefer handmade over machine-made production in consumption contexts that involve feelings of love (Fuchs et al., 2015). First, we provide a broader conceptual framework focused on the notion of symbolic consumption (all studies). Second, our findings go beyond the context of handmade products by including contexts where products are designed but not produced by humans (Study 2). Third, we demonstrate that an important driver of consumers' preference for human vs. robotic labor is uniqueness motives both chronically (Study 3) and situationally activated (Study 4), a process not previously elucidated in the literature.

Pinpointing how human (vs. robotic) labor lends products unique qualities was beyond the scope of this paper, but we speculate that differences in perceived uniqueness stem jointly from the perceived uniqueness of the output of human labor and from the perceived sameness of the output of robotic labor. Little attention has been paid to the latter in consumer psychology. A key goal of machine production is the creation of identical replicates (Liebl & Roy, 2003). This should undermine uniqueness and hence decrease relative preferences for robot production in the case of symbolic products, where uniqueness is more valued. Future research should explore the consequences for judgments and decision making of the perceived sameness of robotic labor. In contexts where precision and reliability are especially valued, the tendency we observed for consumers to prefer human versus robotic labor might reverse. For example, precision likely is an important driver of preferences for product components such as lenses (a possibility which we did not explore in Study 4). Understanding when preferences for human versus robotic labor reverse might offer interesting theoretical and practical insights.

More generally, preferences for human versus robotic labor are likely to be in practice multiply determined and future research should explore additional processes. In addition to those already mentioned in Study 4, candidates include a need for human connection or a desire to reward human effort. Researchers might also explore how consumers' acceptance of robotic labor depends on which part of the production process is automated. This acceptance might be higher when automation affects the production but not the ideation (e.g., the design) of symbolic products. In Study 2, for example, the interaction was driven by a dislike for robotic labor in the condition where the product was designed by machines. Future research should investigate other consumption contexts where robotic production is disliked by consumers and also whether the acceptance of robotic labor for symbolic products increases when artificial intelligence creates unique product configurations or when robots become more anthropomorphic. For instance, consumers might feel more comfortable when robots providing services with symbolic value simulate emotional expression (Waytz & Norton, 2014).

To conclude, our findings suggest a demand-side argument for human labor in the case of products

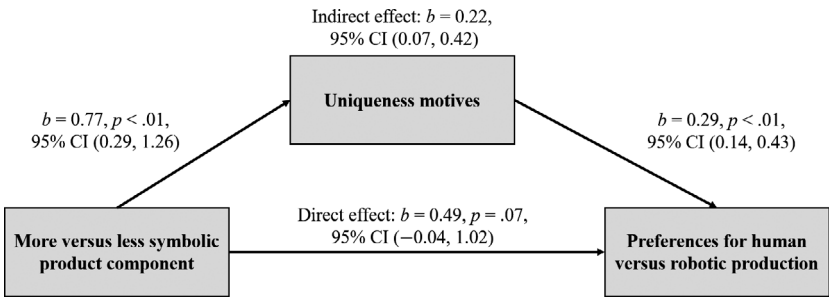

FIGURE 3. Effect of symbolic product component on preferences for human (vs. robotic) production through uniqueness motives (Study 4). Notes: Love, quality, importance, and perceptions of current manufacturing procedures were included as alternative mediator variables. Mediation was tested by calculating 95% CIs using bootstrapping with 10,000 resamples via the PROCESS macro (percentile method).

with symbolic value. Whether in times of rapid technological progress human labor will continue to play a role in production processes depends not only on cost and efficiency, but also on the consumption context and consumer preferences.

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Supporting Information

Additional supporting information may be found in the online version of this article at the publisher's website:

Appendix S1. Methodological Details Appendix.