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Three Essays on the Psychology of Technological Job Replacement and Offshoring

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ABSTRACT

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Technological progress is transforming our society. Modern technologies—e.g., robots and algorithms—are increasingly able to perform a wide variety of tasks that have been previously performed by human labor. Despite its crucial societal importance, little research has examined how people react to this development. This dissertation aims to address this gap by examining how workers, consumers, and the public as a whole respond to the technological replacement of human labor. In addition, this dissertation aims to shed light on how people react to offshoring, one of the most controversial topics of globalization, and how (and why) these reactions are different from other collective layoff strategies such as automation.

This dissertation is organized as follows. Essay 1 studies the psychological reactions of robotic (vs. human) job replacement, and how these reactions depend on whether people contemplate the prospect of their own job loss (versus other people's). Essay 2 investigates consumer preferences for human (vs. robotic) labor, and how these preferences depend on the symbolic value of products, services, and consumption contexts. Essay 3 explores reactions to collective layoffs due to offshoring compared to collective layoffs due to other reasons (e.g., automation, outsourcing), and how these reactions depend on the normative expectation that domestic firms should support their surrounding community.

Together, these three essays help to identify the unique psychological reactions of technological job replacement and offshoring—and provide theoretical frameworks from which these reactions can be understood. By doing so, the findings of this research shed light on two important and frequently debated phenomena, which should be taken into account by policy measures (e.g., appropriately tailoring support programmes for workers affected by

automation), by firms (e.g., considering demand-side consequences of offshoring), and by future research (e.g., understanding when consumers prefer human or robotic labor).

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First and foremost, I want to thank my parents. I cannot put into words the support they have given me and the gratitude and love I feel for them. Without them, this dissertation and university life would be a country far, far away. Second, I want to thank my advisor, Christoph Fuchs. I believe that probably all doctoral students want to work on interesting projects. I also believe, however, that this is almost impossible without a good advisor. And Christoph was one; he introduced me to academia, showed me what passion for academic research looks like, and changed my way of thinking. Third, I want to thank Stefano Puntoni, who is a first-class academic and who contributed a great deal to this dissertation. Forth, I want to thank my colleagues Sara Caprioli, Benedikt Schnurr, and Balachandar Kaliappan for all their support and help. Finally, I want to thank my partner Alexandra Brand, who has supported, encouraged and stood by me all the way.

CHAPTER 1: INTRODUCTION

Advances in robotics and artificial intelligence are transforming the economy. Work that has previously been done by human labor can increasingly be done by intelligent machines and algorithms. Forecasts predict that, in the coming years, these new technologies will have a major impact on society and affect a wide range of occupations, including many high-skilled jobs in administration, law, manufacturing, medicine and other domains. The consequences of these developments for human jobs are frequently debated among journalists and academics, 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). Despite this intense debate, research has provided little insight into how people respond psychologically to this development. The main goal of this dissertation is therefore to investigate the technological replacement of human labor and its psychological effects on workers, consumers, and the public as a whole. In addition, this dissertation aims to shed light on the psychological effects of offshoring, a collective layoff strategy that, along with automation, is one of the most important strategies to increase the efficiency of firms (e.g., Rodrik, 2018).

In Essay 1, I examine the psychology of technological replacement. In eleven studies using different samples and contexts, our investigation reveals that, whereas the public prefers human workers to be replaced by other human workers (vs. robots), the workers whose jobs are actually threatened might prefer to be replaced by robots (vs. human workers). We theorize and show that this is because robotic (vs. human) replacement poses a less immediate threat to people's self-worth. Workers whose jobs are at risk, however, are likely to perceive robotic (vs. human) replacement as a greater threat to their future economic prospects. These findings thus suggest that the technological replacement of human labor has unique

psychological consequences, which should be taken into account by policy measures (e.g., by appropriately tailoring support programs for the unemployed).

In Essay 2, I examine the psychology of human versus robotic production from a consumer perspective. Technological progress allows an increasing number of goods and services to be produced by machines. In such a world, for which products and services does human labor create more value than robotic labor? In four 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). For example, consumers should prefer human (vs. robotic) labor more for getting a tattoo (a context with higher symbolic meaning) than for removing a tattoo (a context with lower symbolic meaning). We theorize and demonstrate 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). These findings thus suggest that whether, in times of rapid technological progress, human labor will continue to play a role in the production processes should not only depend on cost and efficiency, but also on the characteristics of the product and the consumption context.

In Essay 3, I examine how the psychology of automation differs from the psychology of another collective layoff strategy that can substitute domestic labour: offshoring (i.e., moving domestic production and service jobs abroad, Brown, 2004). Compared to other forms of collective layoffs, offshoring seems to evoke particularly strong reactions from consumers and the general public—even if the effects on local employment are comparable (Frey 2019; Rodrik 2018). However, it remains largely unclear *why* firms face such strong negative reactions when they collectively lay off workers due to offshoring. In this research, we theorize and empirically show that these reactions can be understood within a framework of social contracts, which are tacit agreements about generally understood standards of behaviors between firms and their surrounding community (e.g., Donaldson, 1982; Dunfee, Smith, &

Ross Jr., 1999). We propose that the public reacts more negatively to firms that offshore production because offshoring violates a key element of the social contract: the normative expectation that local firms should support the local community. In five studies, analyzing a large corpus of field data on European collective layoffs and conducting four experiments, we show that people react more negatively when collective layoffs are due to offshoring than when the same collective layoff was due to other reasons (e.g., outsourcing, declining demand, or automation)—even if the number of domestic job losses is kept constant. Supporting our social contract account, we further document that the negative effect of offshoring increases when the offshoring firm is domestic (vs. foreign) and when most customers are domestic (vs. foreign). These findings improve our understanding of the psychology of offshoring, and offer important managerial implications (e.g., when firms might face potentially negative demand-side consequences of offshoring decisions)

Taken together, the first two Essays shed light on the psychological reactions to the technological replacement of human labor, which is predicted to affect millions of workers, consumers, and society as whole. The third Essay sheds light on the psychological reactions to offshoring, which is one of the most controversial and politicized aspects of globalization. By doing so, this dissertation represents an important step towards a better understanding of two societally important phenomena—both conceptually and empirically. All three Essays were written together with multiple authors; in each essay, I contributed at every stage of the scientific process by conceptualizing the work, writing the manuscript, designing and carrying out the experiments, and analyzing the data.

CHAPTER 2: PSYCHOLOGICAL REACTIONS TO HUMAN VERSUS ROBOTIC JOB REPLACEMENT

Advances in robotics and artificial intelligence are increasingly enabling organizations to replace humans with intelligent machines and algorithms(National Academies of Sciences, 2017). Forecasts predict that in the coming years these new technologies will affect millions of workers in a wide range of occupations, replacing human workers in numerous tasks (Arntz, Gregory, & Zierahn, 2016; Brynjolfsson, Mitchell, & Rock, 2018), but potentially also in whole occupations (Brynjolfsson & McAfee, 2014; National Academies of Sciences, 2017; Nedelkoska & Quintini, 2018). Despite the intense debate about these developments in economics, sociology, and other social sciences, research has not examined how people react to the technological replacement of human labor. We begin to address this gap by examining the psychology of technological replacement. Our investigation reveals that people tend to prefer workers to be replaced by other human workers (vs. robots); this preference, however, paradoxically reverses when people consider the prospect of their own job loss. We further demonstrate that this preference reversal occurs because being replaced by machines, robots, or software (vs. other humans) is associated with reduced self-threat. In contrast, being replaced by robots is associated with a greater perceived threat to one's economic future. These findings suggest that technological replacement of human labor has unique psychological consequences that should be taken into account by policy measures (e.g., appropriately tailoring support programs for the unemployed).

To obtain initial empirical insights, we first examined whether people perceive robots as a threat to human labor using survey data from a representative sample of European Union citizens (N = 26,750) ("Special Eurobarometer 382, 2015). The data reveal that people tend to more strongly agree than disagree that robots steal people's jobs (1 = totally disagree, 4 = totally agree; M = 3.01, t(26,053) = 88.89, P < 0.001, d = 0.55, 95% CI (0.54, 0.56)). This

pattern was robust across different occupational groups (e.g., students, manual workers, managers) as well as across different countries, suggesting that people generally tend to perceive robots as a threat to human jobs. In line with these results, we argue that—at least for jobs that are not dangerous, dirty, or dull—people should prefer that human workers are employed rather than robots, and therefore prefer human workers to be replaced by other humans (vs. robots). This reasoning is consistent with research on prosocial behavior(Batson & Powell, 2003) documenting that people often care about the wellbeing of other individuals. When job losses affect other people, we thus predict that individuals should prefer human workers being replaced by other human workers rather that by robots.

We theorize, however, that this preference for human replacement should be significantly reduced when people contemplate the prospect of their own job loss (vs. other people's). We posit that this preference reversal occurs because technological (vs. human) replacement has unique psychological consequences—and that these consequences can be understood within a social comparison framework. Specifically, we argue that, compared to a situation where someone else's job is at risk (observer perspective), when one's own job is at risk (employee perspective), social comparison processes become more relevant and overshadow prosocial feelings. Research has shown that social comparisons, the natural tendency to compare oneself with similar or close others (Festinger, 1954), can have a substantial impact on people's self-view, that is, how individuals evaluate their self-worth and abilities (Tesser, 1988). Such identity-relevant comparisons should be more prominent when one's job is taken over by another human than by a robot. Being replaced by, or "losing" out to, a robot should be less self-threating than being replaced by another person. Thus, to avoid self-threat and maintain a positive self-image, people should have a short-term psychological incentive to prefer being replaced by a robot (vs. another human). At the same time, we argue that robotic (vs. human) replacement should make employees feel more concerned about their economic future. That is, whereas comparing one's abilities to a robot may be less threating to

people's self-worth in the short run, it might be more threatening to people's views of their own economic situation in the long run. When thinking about their future, people should realize that the differences in abilities between robots and themselves might not be short-lived but permanent, indicating skill obsolescence (Arnkelsson & Smith, 2000). In light of technological progress, people may even believe that these differences will increase further over time and pose a threat to their future professional prospects.

In sum, we propose that there are seemingly contradictory dispositions towards technological job replacement. Whereas observers should prefer human workers to be replaced by other human workers (vs. robots), this preference should reverse when people consider the prospect of losing their own job. This effect of perspective arises because being replaced by robots (vs. other humans) poses a less immediate threat to people's self-worth. Being replaced by robots as opposed to humans, however, should be perceived as posing a bigger threat to one's economic future. Below, we present the results of eleven studies. Details of these studies are provided in the Methods section. Complete stimulus materials and data are openly available in the Open Science Framework.

In Study 1A, we experimentally tested whether people prefer human over robotic replacement. Half of the student participants read a scenario in which a firm needed to cut costs and therefore had the option replace existing employees either by new employees or by robots. Consistent with our expectations, more participants preferred the employees to be replaced by new employees than by robots (67% vs. 33%, $Z = 2.16$, $P < 0.05$, $h = 0.34$, 95% CI (0.53, 0.81)). The other half read the same text but adopted the perspective of the employees about to lose their jobs. Thus, they read that they could be replaced either by new employees or by robots and were asked about their preference. This subtle manipulation of perspective-taking, from that of an observer to an employee, shifted participants' preferences: when participants were told that their own job was at risk, only 40% of the participants (vs. 67% in the observer condition) preferred being replaced by humans rather than by robots

($\chi^2(1) = 6.59$, $P < 0.05$, $V = 0.27$, 95% CI (0.06, 0.48)). A logistic regression revealed significantly higher preferences for robotic over human replacement when participants considered their own job loss (vs. somebody else's) ($b = 1.12$, $Z = 2.53$, $P < 0.05$, 95% CI (0.25, 1.98)).

We replicated this preference reversal effect with samples of highly qualified (Study 1B; $N = 86$) and regular workers (Study 1C, $N = 124$) from an online labor market. As Figure 1 shows, these two replication studies produced similar results: 63% (resp. 60%) of the participants preferred human replacement in the observer perspective condition, whereas only 40% (resp. 38%) preferred human replacement in the employee perspective condition ($\chi^2(1) = 4.65$, $P < 0.05$, $V = 0.23$, 95% CI (0.00, 0.44), and resp. $\chi^2(1) = 6.34$, $P < 0.05$, $V = 0.23$, 95% CI (0.05, 0.40)).

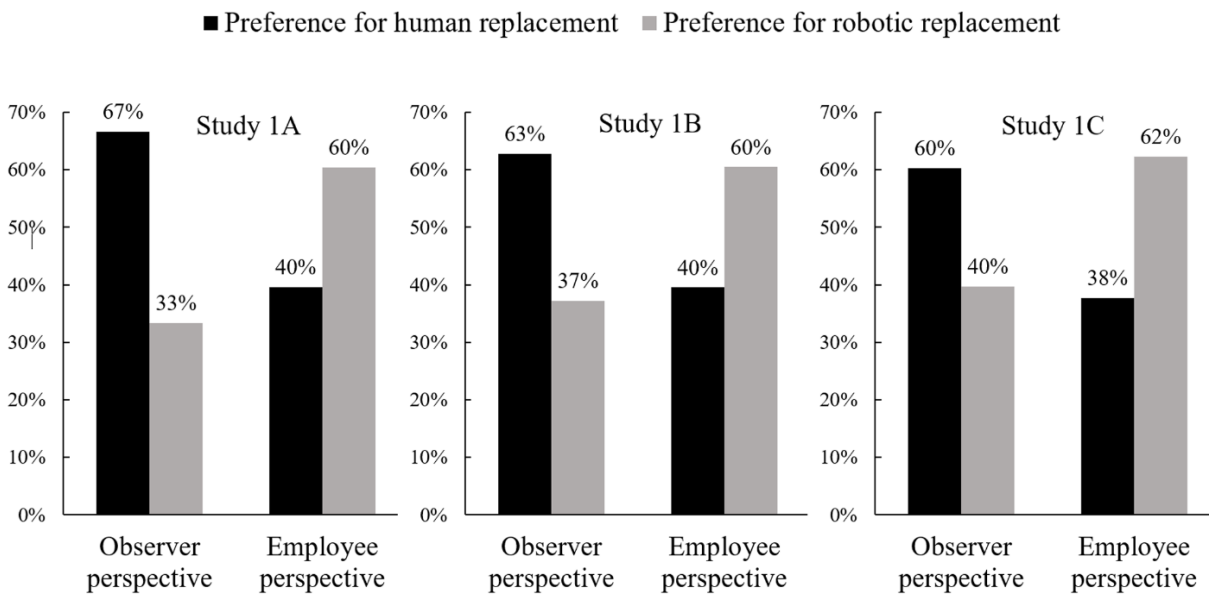

Figure 1. Preference distribution for human and robotic replacement across Study 1A-1C (Essay 1).

In Study 2, we tested whether the different reactions to robotic (vs. human) replacement from an observer (vs. employee) perspective can be generalized using a different dependent measure, negative emotional reactions. In this study, we used a sample that is representative of the United States population in terms of age and gender. The study design was the same as

in Studies 1A-C; that is, participants were either assigned to the observer or the employee perspective condition. Instead of expressing a replacement preference, however, participants were asked to indicate the intensity of their negative emotional reactions (sad, angry, frustrated) in the case of replacement by new employees (= 1) versus modern robots (= 6).

Echoing the results of the previous studies, robotic replacement induced more negative emotions—sadness, anger, and frustration—than human replacement when it was about the job of others (M = 3.88, $t(122) = 2.54$, $P < 0.05$, $d = 0.23$, 95% CI (0.06, 0.43); all t-values reported in Study 2 as well as Studies 3A and 3B refer to one-sample t-tests against scale midpoint). This negative emotional reaction reversed, however, when participants contemplated the prospect of their own job; in this case, robotic replacement induced less negative emotions than human replacement (M = 3.12, $t(127) = -2.50$, $P < 0.05$, $d = -0.22$, 95% CI (-0.40, -0.05)). Taken together, the results of Studies 1A-C and Study 2 demonstrate that robotic (vs. human) replacement leads to different psychological reactions, depending on whether people consider the job of others or their own job.

In Study 3A, we tested our prediction that being replaced by robots (vs. other humans) is less threatening to one's self-identity but more threatening to one's future economic prospects. We used a "white-collar" working context in which European students were asked to imagine working as a lawyer for a reputable law firm. Participants were told that their firm was reorganizing its business processes and that they would be losing their job. Participants were asked whether they would prefer being replaced by another lawyer (= 1) or by software (= 6). Next, participants were asked, using the same scale, which replacement option induced a higher degree of self-threat and greater concerns regarding one's own economic future.

Participants displayed a strong and significant preference for being replaced by software (M = 4.53, $t(84) = 5.45$, $P < 0.001$, $d = 0.59$, 95% CI (0.34, 0.95)). Consistent with our predictions, participants rated robotic replacement as less threatening to their self-identity than human replacement (M = 1.98, $t(84) = -10.70$, $P < 0.001$, $d = -1.16$, 95% CI (-1.80,

−0.77)) but more threatening to their economic future (M = 3.86, $t(84) = 2.26$, $P < 0.05$, d = 0.25, 95% CI (0.03, 0.47)). A linear regression model of preference on self-threat and on future concerns revealed that participants preferred the replacement option that induced a lower degree of self-threat and less future concerns (both coefficients were negative). Yet, the effect of self-threat ($b = -0.860$, $t(82) = -8.07$, $P < 0.001$, 95% CI (−1.04, −0.70)) was about four times greater compared to the marginally significant effect of future concerns (b = −0.214, $t(82) = -2.24$, $P < 0.05$, 90% CI (−0.40, −0.02)). Thus, participants preferred the replacement option that induced a lower degree of self-threat, namely replacement by software.

In Study 3B, we tested whether the psychological effects of robotic (vs. human) replacement in Study 3A replicate with real workers from an industry that is threatened by robotic replacement, manufacturing (Charles, Hurst, & Schwartz, 2018). We asked manufacturing workers whether they would prefer being replaced by a new manufacturing worker (= 1) or by new technology (= 6), and which of these two options induced a higher degree of self-threat and higher future concerns. Participants also indicated whether they thought that their current job could be replaced by new technology at some point in the near future. A substantial part of the participants (98 out of 296) thought that their current job could be replaced by technology in the near future.

Again, we found a preference for being replaced by new technology—both among manufacturing workers who believed their current job could be replaced by technology in the near future (M = 4.10, $t(97) = 3.12$, $P < 0.01$, d = 0.31, 95% CI (0.10, 0.57)) and among those who did not (M = 4.31, $t(197) = 6.32$, $P < 0.001$, d = 0.45, 95% CI (0.30, 0.62)). Two OLS regression models—estimated separately for those who thought that technological replacement was possible in the near future and for those who did not—revealed that participants had a stronger preference for the replacement option that induced a lower degree

of self-threat and future concerns. Across both models, the effect of self-threat ($b_{believe}$ = −0.620, $t(95) = -6.46$, $P < 0.001$, 95% CI (−0.82, −0.40) vs. $b_{non\text{-}believe} = -0.828$, $t(195) = -13.66$, $P < 0.001$, 95% CI (−0.94, −0.72)), however, was at least two times greater compared to that of future concerns ($b_{believe} = -0.280$, $t(95) = -2.51$, $P < 0.05$, 95% CI (−0.50, −0.09) vs. $b_{non\text{-}believe} = -0.111$, $t(195) = -1.78$, $P < 0.1$, 95% CI (−0.26, 0.05); see Appendix A for detailed results). In sum, workers who regarded technological replacement as likely (and those who did so to a lesser extent) would rather be replaced by new technology than by another worker, as this option induced a lower degree of self-threat.

In Study 4, we further examined the effect of robotic versus human replacement on feelings of self-threat and future concerns in a 2(replacement option: human vs. robotic) x 2(appraisal: self-threat vs. future concern) mixed design, with the first factor manipulated between participants and with repeated measures for the second factor. In the robotic replacement condition, participants were asked to imagine working for a logistics firm and read that, in the course of a reorganization process, the firm had decided to replace them with modern robots. In the human replacement condition, participants read the same text, with the difference that the firm had decided to replace them with other warehouse workers. We then measured self-threat and future economic concerns for all participants.

A 2x2 mixed model ANOVA revealed a significant interaction effect ($F(1, 87) = 61.87$, $P < 0.001$). When participants were replaced by a robot, they expressed a significantly lower degree of self-threat ($M = 3.00$) than future concerns ($M = 4.09$; $t(43) = -4.80$, $P < 0.001$, d = −0.79, 95% CI (−1.20, −0.47)). When participants were replaced by another worker, however, they expressed a significantly higher degree of self-threat ($M = 4.41$) than future concerns ($M = 3.29$; $t(44) = 6.70$, $P < 0.001$, $d = 0.89$, 95% CI (0.60, 1.27)). But most importantly, being replaced by a robot (vs. by another warehouse worker) led to a lower degree of self-threat ($t(87) = -4.48$, $P < 0.001$, $d = -0.95$, 95% CI (−1.46, −0.54)) but more

concerns regarding one's own economic future ($t(87) = 3.37$, $P < 0.01$, $d = 0.71$, 95% CI (0.30, 1.20)).

In Study 5A, we tested whether reduced self-threat—the main driver of preferences for robotic (vs. human) replacement in the previous studies—is indeed driven by social comparison processes. We used the same choice design as in Study 3A and 3B but with yet another occupational context (junior market analyst) and sample (US students). In addition to preference for robotic (vs. human replacement) and self-threat, we now also measured participants' engagement in social comparisons. Out of 90 participants, only five rated the robotic replacement scenario as not believable and were excluded from further analyses. By excluding these participants, we alleviated the possibility that some participants might experience robotic replacement as less self-threatening simply because they do not believe that a given human job can be fully replaced by technology.

Consistent with the previous results, one-sample t-tests revealed that participants preferred being replaced by software ($M = 4.65$, $t(84) = 7.01$, $P < 0.001$, $d = 0.76$, 95% CI (0.50, 1.12)), and perceived robotic (vs. human) replacement as less threatening to their self-identity ($M = 1.92$, $t(84) = -12.65$, $P < 0.001$, $d = -1.37$, 95% CI (-2.02, -0.98)). A mediation model, with engagement in social comparisons as the explanatory variable, self-threat as the mediator variable and preference for human versus robotic replacement as the dependent variable, supported our proposed process chain (see Figure 2). That is, people's tendency to compare themselves less with software (vs. other humans) ($M = 1.67$, $t(84) = -22.69$, $P < 0.001$, $d = -2.46$, 95% CI (-3.35, -1.95)) explained the reduced self-threat of robotic (vs. human) replacement ($b = 0.452$, $t(83) = 2.78$, $P < 0.01$, 95% CI (0.13, 0.78)), which, in turn, drove participants' preferences for being replaced by software (vs. other humans) (indirect effect: $b = -0.455$, $Z = -2.67$, $P < 0.01$, 95% CI (-0.85, -0.16)). Thus, these results support our proposed account that social comparisons can explain why people's self-identity is less threatened by robotic replacement.

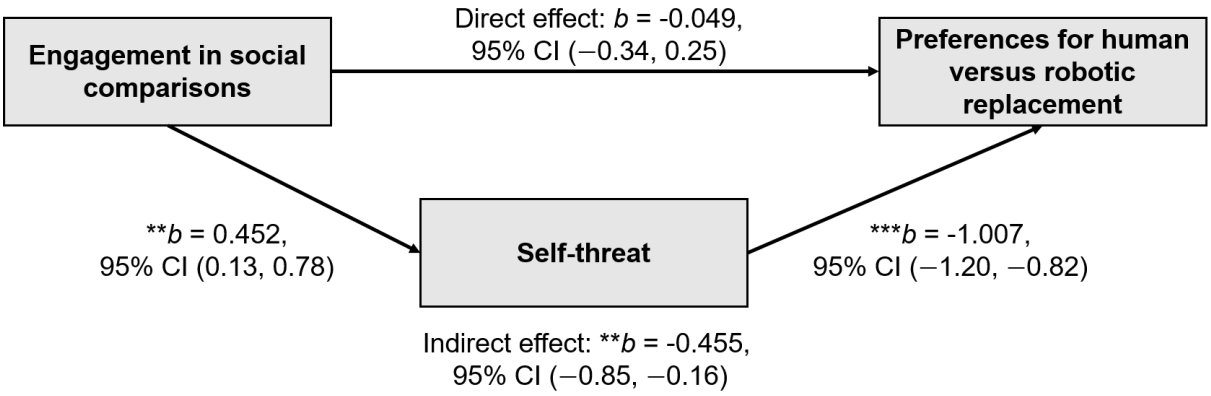

Figure 2. Mediation diagram Study 5A (Essay 1).
Notes: Mediation was tested by calculating bias-corrected 95% confidence intervals using bootstrapping with 10,000 resamples via the PROCESS macro[12]. Significance levels: ** $P < 0.01$, *** $P < 0.001$.

In Study 5B, we tested whether the effect of robotic (vs. human) replacement on self-threat observed in Study 4 is due to social comparison processes (differently from Study 5A, in Study 5B, the replacement option is thus manipulated between participants). In addition to self-threat, our focal dependent variable, we also measured the extent to which participants engaged in social comparisons. Out of 240 participants, only ten found the replacement scenarios as not believable and were excluded from further analyses.

Consistent with the previous results, we again found that being replaced by a robot (vs. by another warehouse worker) led to a lower degree of self-threat ($M = 3.98$ vs. $M = 4.81$; $t(228) = -4.32$, $P < 0.001$, $d = -0.57$, 95% CI (-0.83, -0.30)). A mediation model supported our prediction that this reduced effect of robotic replacement on self-threat is mediated by social comparison processes; that is, participants rated being replaced by a robot (vs. another warehouse worker) as less self-threatening because they were less likely to compare themselves with a robot than with another worker (indirect effect: $b = 0.183$, $Z = 2.56$, $P < 0.05$, 95% CI (0.06, 0.34)). The results of this mediation model provide further support that social comparison processes underlie the effect of robotic (vs. human replacement) on self-threat.

In Study 5C, we tested whether social comparisons underlie the increased self-threat associated with human (vs. robotic) replacement through experimental manipulation. Specifically, we manipulated the extent to which other human employees were relevant targets of social comparisons. We predicted that other human workers should become less relevant comparison targets—and should therefore trigger less self-threatening social comparisons—when they do not rely on their own (human) abilities to perform the job (Festinger, 1954), but on technological (nonhuman) abilities such as artificial intelligence. To test this prediction, we randomly assigned participants to one of three conditions. In all conditions, participants were asked to imagine working as professional translators and read that, as part of a reorganization process, the firm had decided to replace them. In the first condition, participants were told that they would be replaced with modern software using artificial intelligence. In the other two conditions, participants read the same text but with the difference that the firm had decided to replace them with another (human) employee (condition 2), or with another (human) employee using artificial intelligence (condition 3). In addition to self-threat, we also measured relevance of social comparison.

Perceived relevance of social comparison varied across conditions ($F(2, 358) = 33.76$, $P < 0.001$, $\eta^2 = 0.16$, 95% CI (0.09, 0.22)): Another employee (using her own abilities) was rated as a more relevant comparison target ($M = 5.34$) than software relying on artificial intelligence ($M = 4.11$; $t(358) = 6.74$, $P < 0.001$, $d = 0.93$, 95% CI (0.66, 1.21)) or than another employee relying on artificial intelligence ($M = 3.99$; $t(358) = 7.41$, $P < 0.001$, $d = 0.95$, 95% CI (0.69, 1.25)). We found no significant differences between software relying on artificial intelligence and another employee relying on artificial intelligence ($t(358) = 0.66$, $P = 0.508$, $d = 0.08$, 95% CI $(-0.17, 0.34)$).

Mirroring these differences, participants' levels of self-threat also varied across conditions ($F(2, 358) = 17.88$, $P < 0.001$, $\eta^2 = 0.09$, 95% CI (0.04, 0.15)). Another employee (using her own abilities) induced a higher degree of self-threat ($M = 4.58$) than software

relying on artificial intelligence (M = 3.68, $t(358)$ = 4.90, P < 0.001, d = 0.64, 95% CI (0.37, 0.93)) or than another employee relying on artificial intelligence (M = 3.58; $t(358)$ = 5.40 P < 0.001, d = 0.68, 95% CI (0.40, 0.98)). We found no significant differences between software relying on artificial intelligence and another employee relying on artificial intelligence ($t(358)$ = 0.50, P = 0.620, d = 0.07, 95% CI (−0.19, 0.31)). Thus, the effect of human (vs. robotic) replacement on self-threat is reduced when participants were replaced by another employee who—not relying on her own but on the abilities of a machine to perform their job— was perceived as a less relevant target of social comparisons.

In Study 6, we tested whether the effects documented in the previous experiments replicate in a correlational study among people who had recently lost their job. Specifically, we tested whether self-reported reasons for people's job loss, either robotic or human replacement, are empirically related to self-identity threats and perceived future economic prospects. We recruited workers from an online labor market who had lost their job in the previous two years. To measure attributions of job loss to robotic and human replacement, participants rated the extent to which they thought their job had become automated (i.e., they had been replaced by machines, robots, or software), as well as the extent to which they thought they had been replaced by another worker. In addition to job-loss-related self-threat and future concerns, we also measured a series of control variables (e.g., other reasons for job loss, the duration of unemployment, former and current income).

Consistent with the results of the previous studies, we found evidence for a significant positive relationship between self-threat and attribution of the job loss to human replacement ($r(214)$ = 0.26, P < 0.001, 95% CI (0.14, 0.38)), but no evidence for a significant relationship between self-threat and attribution of the job loss to robotic replacement ($r(214)$ = −0.05, P = 0.50, 95% CI (−0.19, 0.09)). Conversely, we found evidence for a significant positive relationship between future economic concerns and attribution of the job loss to robotic replacement ($r(214)$ = 0.14, P < 0.05, 95% CI (0.03, 0.24)), but no evidence for a significant

relationship between future economic concerns and attribution of the job loss to human replacement ($r(214) = 0.10$, $P = 0.13$, 95% CI (-0.03, 0.23)). To examine this pattern of results more precisely, we estimated four OLS regression models with self-threat and future concerns as dependent variables (see Table 1). Each model controlled for an increasing number of factors: Models 1a and 1b controlled for other reasons for job loss. Models 2a and 2b controlled for other reasons for job loss and the degree of future economic concerns when regressing self-threat and vice versa, since they were positively related ($r(214) = 0.27$, $P < 0.001$, 95% CI (0.12, 0.40)). Models 3a and 3b controlled for other reasons for job loss, the degree of future economic concerns and various characteristics of the lost job. Models 4a and 4b controlled for other reasons for job loss, the degree of future economic concerns, various characteristics of the lost job and the workers' current situation (e.g., current employment status) and other demographical variables.

Across Models 1a-4a, we found no significant relationship between perceived robotic replacement and self-threat (all Ps > 0.10; see Table 2 for exact P values and CIs). In each model, the magnitude of this relationship was more than two times smaller compared to that of the relationship between job loss attribution to human replacement and self-threat, which was significant and positive in all four models (all Ps < 0.01). In contrast, across all Models 1b-4b, we found a significant relationship between perceived robotic replacement and future economic concerns (all Ps < 0.05). In each model where we controlled for self-threat, the magnitude of this relationship was about two times greater compared to the magnitude of the relationship between perceived human replacement. Together, these results replicate and validate our experimental findings with people who lost their jobs: job loss was associated with different psychological consequences, depending on whether workers perceived their job loss to be due to robotic or human replacement.

Table 1. Regression models of self-threat and future economic concerns in Study 6 (Essay 1).

	Dependent variable							
	Self-threat				Future economic concerns			
Model	1a	2a	3a	4a	1b	2b	3b	4b
Attribution of job loss to robotic replacement	-0.045 (0.044)	-0.070 (0.043)	-0.063 (0.044)	-0.059 (0.044)	0.086* (0.038)	0.096* (0.037)	0.097* (0.038)	0.093* (0.038)
Attribution of job loss to human replacement	0.154** (0.036)	0.133** (0.036)	0.137** (0.036)	0.134** (0.036)	0.072* (0.032)	0.038 (0.032)	0.041 (0.032)	0.048 (0.032)
Attribution of job loss to other reasons	0.050 (0.040)	0.027 (0.076)	0.029 (0.039)	0.024 (0.039)	0.081* (0.035)	0.070* (0.034)	0.073* (0.034)	0.077* (0.034)
Future economic concerns		0.294** (0.076)	0.270** (0.077)	0.269** (0.078)				
Self-threat						0.223** (0.058)	0.209** (0.059)	0.206** (0.060)
Time worked at former company			-0.184 (0.122)	-0.192 (0.135)			0.108 (0.108)	0.010 (0.119)
Number of employees at former company			0.007 (0.039)	0.001 (0.040)			-0.011 (0.035)	-0.020 (0.035)
Former income			0.194** (0.073)	0.212* (0.088)			0.080 (0.065)	0.079 (0.078)
Duration of unemployment			0.001 (0.009)	0.004 (0.010)			0.006 (0.008)	-0.001 (0.008)
Currently unemployed				-0.081 (0.238)				0.213 (0.208)
Current income				-0.003 (0.079)				-0.061 (0.069)
Gender				-0.561* (0.207)				0.075 (0.185)
Age				-0.004 (0.012)				0.021* (0.010)
Dummy some college, no degree [a]				-0.131 (0.379)				0.029 (0.332)
Dummy university degree or more [a]				-0.044 (0.362)				0.251 (0.316)
Intercept	2.573** (0.431)	1.615** (0.486)	1.467* (0.551)	2.060** (0.661)	3.263** (0.375)	2.690** (0.393)	2.237** (0.467)	1.661** (0.581)
Observations	216	216	216	216	216	216	216	216
R-squared	0.084	0.143	0.177	0.208	0.05	0.112	0.129	0.168

Notes: OLS regressions with standard errors in parentheses. * $P < 0.05$. ** $P < 0.01$

[a] Education dummies are to be interpreted as relative differences to the category "High school or less"

Table 2. Exact *P* values and 95% confidence intervals (in parenthesis) for regression models in Study 6 (Essay 1).

	Dependent variable							
	Self-threat				Future economic concerns			
Model	1a	2a	3a	4a	1b	2b	3b	4b
Attribution of job loss to robotic replacement	*P* = 0.313 (-0.14, 0.06)	*P* = 0.108 (-0.17, 0.03)	*P* = 0.152 (-0.16, 0.04)	*P* = 0.174 (-0.15, 0.04)	*P* = 0.026 (0.02, 0.14)	*P* = 0.011 (0.03, 0.16)	*P* = 0.011 (0.03, 0.16)	*P* = 0.015 (0.02, 0.16)
Attribution of job loss to human replacement	*P* < 0.001 (0.09, 0.22)	*P* < 0.001 (0.06, 0.20)	*P* < 0.001 (0.07, 0.21)	*P* < 0.001 (0.06, 0.20)	*P* = 0.024 (0.01, 0.14)	*P* = 0.240 (-0.03, 0.10)	*P* = 0.202 (-0.03, 0.12)	*P* = 0.143 (-0.02, 0.12)
Attribution of job loss to other reasons	*P* = 0.206 (-0.02, 0.13)	*P* = 0.495 (-0.05, 0.09)	*P* = 0.451 (-0.4, 0.10)	*P* = 0.533 (-0.05, 0.09)	*P* = 0.020 (0.02, 0.15)	*P* = 0.040 (0.01, 0.15)	*P* = 0.032 (0.01, 0.15)	*P* = 0.024 (0.01, 0.15)
Future economic concerns		*P* < 0.001 (0.13, 0.44)	*P* = 0.001 (0.09, 0.43)	*P* = 0.001 (0.11, 0.43)				
Self-threat						*P* < 0.001 (0.10, 0.35)	*P* = 0.001 (0.07, 0.38)	*P* = 0.001 (0.08, 0.34)
Time worked at former Company			*P* = 0.133 (-0.45, 0.08)	*P* = 0.154 (-0.49, 0.08)			*P* = 0.316 (-0.11, 0.34)	*P* = 0.935 (-0.25, 0.27)
Number of employees at former company			*P* = 0.850 (-0.07, 0.09)	*P* = 0.990 (-0.07, 0.09)			*P* = 0.744 (-0.08, 0.06)	*P* = 0.567 (-0.09, 0.05)
Former income			*P* = 0.009 (0.06, 0.34)	*P* = 0.017 (0.02, 0.41)			*P* = 0.218 (-0.05, 0.20)	*P* = 0.315 (-0.10, 0.23)
Duration of unemployment			*P* = 0.914 (-0.03, 0.03)	*P* = 0.714 (-0.03, 0.03)			*P* = 0.444 (-0.01, 0.07)	*P* = 0.913 (-0.01, 0.07)
Currently unemployed				*P* = 0.732 (-0.58, 0.39)				*P* = 0.307 (-0.26, 0.58)
Current income				*P* = 0.965 (-0.17, 0.15)				*P* = 0.374 (-0.20, 0.10)
Gender				*P* = 0.007 (-1.00, -0.16)				*P* = 0.686 (-0.31, 0.47)
Age				*P* = 0.744 (-0.03, 0.02)				*P* = 0.045 (0.00, 0.04)
Dummy some college, no degree				*P* = 0.730 (-0.89, 0.60)				*P* = 0.930 (-0.67, 0.75)
Dummy university degree or more				*P* = 0.903 (-0.76, 0.67)				*P* = 0.428 (-0.44, 0.92)
Intercept	*P* < 0.001 (1.8, 3.38)	*P* = 0.001 (0.66, 2.60)	*P* = 0.008 (0.39, 2.50)	*P* = 0.002 (0.69, 3.52)	*P* < 0.001 (2.53, 4.02)	*P* < 0.001 (1.82, 3.52)	*P* < 0.001 (1.14, 3.20)	*P* = 0.005 (0.19, 2.93)

Notes: Values in parenthesis refer to 95% CIs using bootstrapping with 1,000 resamples

Technological progress is expected to affect millions of workers in a wide variety of occupations in the coming decades (National Academies of Sciences, 2017). This transition will primarily affect specific work tasks (Arntz et al., 2016; Brynjolfsson et al., 2018), but also—to a substantial extent—entire jobs (Brynjolfsson & McAfee, 2014; National Academies of Sciences, 2017; Nedelkoska & Quintini, 2018). Despite the crucial societal importance of this development, no prior research has examined how people react to the technological replacement of human labor. In eleven studies using different samples and contexts, our investigation reveals that whereas the public prefers human workers to be replaced by other human workers (vs. robots), the workers whose jobs are actually threatened might prefer to be replaced by robots (vs. human workers). This is because robotic (vs. human) replacement poses a less immediate threat to people's self-worth. Workers whose jobs are at risk, however, are likely to perceive robotic (vs. human) replacement as a greater threat to their future economic prospects. Given the scant literature on the psychology of workplace automation (Waytz & Norton, 2014), our research represents an important step towards a better understanding of the psychological consequences of technological (vs. human) job replacement—and demonstrates that these consequences can be understood within a social comparison framework.

The results of this research may help policymakers design support programs for the unemployed. Such programs can help to reemploy job seekers and reduce negative effects on their mental and physical health (McKee-Ryan, Song, Wanberg, & Kinicki, 2005). Appropriately tailoring these interventions, however, has proven difficult in practice (Wanberg, 2012). Our findings suggest that interventions targeted at restoring feelings of competence and self-worth, which represent essential coping resources in the event of a job loss (McKee-Ryan et al., 2005), should be less of a priority when workers attribute their job loss to automation as opposed to human replacement. For those workers who attribute their job loss to automation, on the other hand, it would be better to devote all resources to

interventions targeted at upgrading skills and retraining. Such retraining interventions could not only provide workers with new skills that are difficult to automate (e.g., social or emotional skills (Waytz & Norton, 2014)), but could also alleviate feelings of future economic concerns by reducing perceptions of skill obsolescence. An additional study (N = 280) provides empirical support for the reasoning that the observed effect of robotic (vs. human) replacement on future economic concerns is indeed driven by perceptions that there is decreasing demand for one's skillset in the labor market (see Appendix A). Based on these results, we speculate that job seekers who attribute their job loss to automation should show less inertia in reskilling than other job seekers who are often too optimistic in the face of job loss (Wanberg, Basbug, Van Hooft, & Samtani, 2012). Therefore, they should particularly benefit from interventions that address market conditions and guide them towards new (in-demand) occupations (Hendra et al., 2016).

Based on our findings in Study 6, that both age and attributions of job loss to robotic replacement are positively related to future economic concerns, it is conceivable that technological replacement may further reduce the already lowered job-search motivation of older job seekers (Wanberg, Kanfer, Hamann, & Zhang, 2016). Without active labor market policies, this might further increase the likelihood of older workers leaving the labor market (Van Ours & Vodopivec, 2006).

Our findings suggest that the psychological consequences of robotic (vs. human) job replacement hold across various types of samples with different cultural backgrounds (i.e., from European and from North American countries). Yet, we acknowledge the existence of socio-economic and cultural differences across countries—for example, in the extent to which workers blame themselves (vs. the system) for their unemployment and job search experiences (Sharone, 2013)—that might affect how workers deal with these consequences, and what responses they expect from the government.

Our research focuses on how people react when modern technology replaces jobs. More research is needed to investigate how people react (and adapt) when modern technology replaces not entire jobs but specific tasks (e.g., by exploring how engaging workers in the decision to automate specific tasks affects their attitude towards modern technology).

Our findings may also inspire novel predictions regarding the broader societal consequences of technological unemployment. For example, based on our results, it is conceivable that organized resistance among workers to job losses tends to be weaker when the job losses are attributed to automation than when they are attributed to human replacement (e.g., outsourcing). We hope that, particularly in times when policymakers are discussing strategies and practices intended to support workers who have been displaced by technology (Mitchell & Brynjolfsson, 2017), our work encourages more research on the psychological consequences of technological unemployment before technological progress disrupts specific jobs and occupations

Methods

Our research complied with all relevant ethical regulations regarding human research participants. Informed consent was obtained from every participant. In all studies, participation was voluntary and subjects could leave at any time. All test statistics are two-sided. For all parametric tests, data were assumed to be normal, but this was not formally tested. However, all confidence intervals were obtained via bootstrapping with 1,000 iterations, which produces intervals that do not rely on the assumption of normality for valid inference. Analyses for Studies 1, 2, 3A, 3B, and were conducted with STATA 14.1, and analyses for Studies 5A, 5B, 5C, and 6 were conducted with SPSS 23. Sample size estimation was based on availability and sample size of original studies (Study 1A, Study 1B, Study 3A, Study 4, Study 5A; Study 6), a priori power analysis using G*Power designed to have 80% power (Study 1C), and the criterion that replication studies should have (at least) 2.5 times the

original sample size[22] (Study 2, Study 3B, Study 5B, Study 5C). Data collection was performed blind to the conditions of the experiments. Data analysis was not blind to the conditions of the experiments. No participants or data points were excluded from the analyses.

Study 1A. Participants (N = 124, 69 male, M_{age} = 19 years) were students from a university in the Netherlands. Thirty-four participants failed an attention check and were excluded from further analyses. Participants were randomly assigned to either the observer perspective or the employee perspective condition. In the observer perspective condition (N = 42), participants read that a company needed to cut costs in one of its business units and had two options available: replacing some of its existing employees with new employees or with robots from an external supplier. Next, participants were asked whether they would prefer that existing employees were replaced by new employees or by robots.

In the employee perspective condition (N = 48), we used the materials described above, except that we changed the following words: instead of "a company", participants read "your company"; and instead of "existing employees will be replaced", participants read "you will be replaced". In both conditions, the level of cost reduction and output quality associated with robotic or human replacement were held constant. Participants were then asked to complete the same preference question.

Studies 1B and 1C. In Study 1B, participants (N = 95, 59 male, M_{age} = 38 years) were highly qualified online workers who were recruited through an online research platform (Amazon Mechanical Turk, MTurk, Master Workers). Nine participants failed an attention check and were excluded from further analysis. The design and procedure of this study were similar to that of Study 1A. Before indicating their preferences, participants in the observer perspective (N = 43) and the employee perspective (N = 43) conditions were asked to elaborate on the two replacement options.

In Study 1C, participants (N = 124, 70 male, M_{age} = 39 years, MTurk) were regular online workers from the US and Canada who were either assigned to the observer (N = 63) or the employee (N = 61) perspective condition. In the observer (vs. employee) perspective condition, participants were asked to consider that employees (vs. they) are working for a large manufacturing company. Next, participants were told that the (vs. their) company had decided to reorganize its business processes. As a part of this reorganization process, some of the existing employees (vs. they) would be replaced and thus lose their jobs. In order to achieve the goals of the reorganization process, the company had two options available: existing employees (vs. they) could be replaced either by modern robots, which would perform the tasks automatically, or by other employees.

Study 2. A sample of 251 participants (125 male, M_{age} = 41 years) representative of the US population in terms of gender and age were recruited by Dynata, a global market research agency. A Qualtrics quota error resulted in oversampling one male participant. We used the same study design as in Studies 1A-C, but instead of preference, we measured negative emotional reactions as a dependent variable with three items ("I would feel more (1) sad, (2) frustrated, (3) angry if existing employees were replaced (vs. if I was replaced)…", 1 = by other employees (vs. by another employee), 6 = by modern robots (vs. by a modern robot), α = 0.80).

Study 3A. Participants (N = 95, 56 male, M_{age} = 20 years) were students from a university in the Netherlands. Ten participants failed an attention check and were excluded from further analyses. Participants were asked to imagine that they had recently graduated from law school and now worked at a reputable law firm. This information was followed by a description of their main tasks (see Appendix A). Participants were told that they had performed their tasks satisfactorily (to avoid participants attributing their job loss to inadequate performance). Next,

participants were told that after doing their job for one year their company had decided to reorganize its business processes. As a part of this reorganization process, they would be replaced and thus lose their job. In order to achieve the goals of the reorganization process, the company had two options available. The company could either replace the employee by another lawyer who had recently graduated from law school, or by a modern software algorithm that would perform the employee's tasks automatically. The level of expected effectiveness and output quality associated with both replacement options were held constant. Next, participants indicated whether they would prefer being replaced by another lawyer or by software (1 = lawyer, 6 = software). We then measured self-threat ("Which option would..." "…make you feel more devalued?", "…make you raise more doubts about yourself?", and "…make you question more your own abilities?", α =0 .89), and future economic concerns ("Which option would..." "…make you feel more worried about the future?", "…make it more difficult for you to find another job?", and "…make it more stressful for you to find another job?", α = .72) (1 = lawyer, 6 = software).

Study 3B. Participants (N = 296, 192 male, M_{age} = 38 years) were workers from the manufacturing industry who were recruited by Prolific, a European-based online panel(Palan & Schitter, 2018). In addition to the prescreening done by the agency, participants were again asked to verify their employment in the manufacturing industry before entering the actual study.

The design and procedure of this study were similar to that of Study 3A. Participants were first asked to name their current job in the manufacturing industry. Next, participants were asked to imagine that their company had decided to reorganize its business processes. As a part of this reorganization process, they would be replaced and thus lose their job. In order to achieve the goals of the reorganization process, the company had two options available. The company could either replace them with new manufacturing workers or with a new

technology that would perform their tasks automatically. Next, participants were asked whether they would prefer being replaced by a new manufacturing worker or by new technology (1 = new manufacturing worker, 6 = new technology). We measured self-threat (α = 0.87) and future concerns (α = 0.78) with the same three bipolar items used in Study 3A. After completing these measures, we also administered an item to check whether participants believed that their current job could be replaced by new technology at some point in the near future (1 = yes, 2 = no).

Study 4. Participants (N = 92, 44 male, M_{age} = 20 years) were students from a university in the Netherlands, who participated in a between-participants experiment. Three participants failed an attention check and were excluded from further analyses. Participants were randomly assigned to either the robot or human replacement condition. In the robot replacement condition (N = 44), participants were asked to imagine that they had recently graduated from high school and now worked at a large logistics firm, which was followed by a description of their main tasks (Appendix A). Next, participants were told that after doing their job for one year their company had decided to reorganize their business processes, and therefore they would lose their job. They were told that in order to achieve the goals of the reorganization process, they would be replaced by a modern robot that would perform their tasks automatically. In the human replacement condition (N = 45), participants read the same text but were told that they would be replaced by another warehouse worker. In both conditions, participants were told that they had performed their tasks satisfactorily (to avoid participants attributing their job loss to inadequate performance).

Next, we measured self-threat and future concerns. Self-threat was measured with two bipolar items: "If I were replaced by a modern robot (another warehouse worker), then…" "I would [not] question my abilities [at all]" and "It would [not] raise [any] doubts about myself" 1/[6]. We recoded these two items so that higher values indicate a higher degree of

self-threat (r = 0.78). Future concerns were also measured with two items: "How worried would you be about your future?" and "How difficult do you think it would be for you to find another job?" (1 = not at all, 6 = extremely, r = 0.52).

Study 5A. Participants (N = 90, 19 male, M_{age} = 22 years) were business students from a university in the US. The study design and procedure were the same as in Study 3A. We varied the profession to increase the generalizability of our findings. That is, participants were asked to imagine that they had recently graduated from business school and now worked as a junior market analyst at a reputable firm, which was followed by a description of their main tasks (Appendix A). Accordingly, participants then read the same text as in Study 3A with the difference that they would either be replaced by another market analyst who recently graduated from business school, or by a modern software algorithm that would perform the employee's tasks automatically.

In addition to preference (1 = another person, 6 = software) and which option induced a higher degree of self-threat (1 = another person, 6 = software, α = 0.83), we also measured participants' engagement in social comparisons as an explanatory variable. The latter was measured with the following four items adapted from (Darnon et al. (2010): "It was easier to compare myself with…", "I compared myself more strongly with…", "It was more natural to me to compare myself with…", and "To me, it was more relevant to compare my abilities with…", 1 = the other person, 6 = the modern software (α = 0.77). Finally, we asked participants whether they found the scenario in which a junior market analyst was replaced by modern software believable (1 = yes, 2 = no). Five participants rated the replacement scenario as not believable and were excluded from further analyses.

Study 5B. Participants (N = 242, 122 male, M_{age} = 37 years, MTurk) from the US and Canada participated in a study similar to Study 4. Two participants failed an attention check and were

excluded from further analyses. In addition to self-threat (α = 0.85), we also measured participants' engagement in social comparisons as a process variable with four items: "It was easy to compare myself with…", "I compared myself strongly with…", "It was natural to me to compare myself with…", and "It was relevant to me to compare my abilities with…" "…the modern robot (vs. the other warehouse worker) replacing me", 1 = not at all, 6 = very much (α = 0.86). We also asked participants whether they found the replacement scenarios believable (1 = yes, 2 = no). Ten participants rated the scenarios as not believable and were excluded from further analyses.

Study 5C. Participants (N = 361, 177 male, M_{age} = 37 years, MTurk) from the US and Canada participated in a three-condition between-participants study. Participants were randomly assigned to either the robotic replacement, the human replacement, or the human replacement complemented by technology condition. In the human replacement condition (N = 123), participants were asked to imagine that they had studied languages at college and recently started to work as a professional translator for a large international company, where their job was to translate technical product features from English into other languages. Next, participants were told that their company had informed them that, as part of a reorganization process, they would lose their job and would be replaced by another employee. In the robotic replacement condition (N = 119) and the human replacement complemented by technology condition (N = 119), participants read the same text but were told that they would be replaced by modern software that used artificial intelligence and by another employee who used artificial intelligence, respectively.

Next, we measured self-threat, our dependent variable, as in Study 4 (α = .83). As a manipulation check, we also measured the extent to which participants perceived each replacement option to be a relevant target of social comparisons: "As a translator, I felt it makes sense to compare myself with…", "It felt reasonable to compare myself with…", "As a

translator, I felt somewhat similar to…" "…the employee that uses artificial intelligence (vs. the software that uses artificial intelligence, vs. the employee)", and "I compared myself with the employee that uses artificial intelligence (vs. the software that uses artificial intelligence, vs. the employee) that replaced me as a professional translator", 1 = strongly disagree, 7 = strongly agree (α = 0.90).

Study 6. Participants were recruited through MTurk. We posted a task entitled "Tell us your opinion on modern work" which was described as "This is a study about unemployment. So, we are looking for people who have lost their jobs within the last two years, and who would like to give us their opinion about changes in today's working environment". After accepting the HIT, but before taking the actual survey, participants were asked whether they had lost their job at least once within the last two years. Participants were informed that if they answered "yes" to this screen-out question, they would proceed with the survey. If they answered "no", they would be offered the possibility to participate in another survey. This screen-out question before participants entered the final survey helped ensure the validity of our results by excluding those participants who did not meet our selection criteria specified in the description of the posted task but who nevertheless started the survey (Sharpe Wessling, Huber, & Netzer, 2017). Of the 275 people who accepted our task and initially started our survey, 216 participants (128 male, M_{age} = 35 years) answered "yes" and thus represented the final sample for this study.

As independent variables, we measured the extent to which workers attributed their (most recent) job loss to robotic and human replacement. Additionally, we measured the extent to which workers perceived other reasons to be responsible for their job loss using one item. Therefore, following the preamble "To what extent do you think the following reasons played a role why you lost your job?", participants rated the following three statements: "My job became automated (my job is now done by machines, robots, a software, etc.)", "I was

replaced by another worker (for example, my job is now done by people working in other firms, other countries, etc.)", and "Other reasons" (1 = played no role, 10 = played a major role).

As dependent variables, we measured the degree of job-loss-related self-threat and future economic concerns. Specifically, participants were told to think of the reasons for their job loss and that we are interested in how these reasons made them feel. Self-threat was measured with three items: "Due to the reasons why I lost my job", "I did question my abilities", "It did make me feel extremely devalued", and "It did raise doubts about myself", 1 = strongly disagree, 6 = strongly agree $\alpha = .79$. Future concerns were measured with three items: "How worried were you about your future?" (1 = not at all worried, 6 = extremely worried), "How difficult do you think it would be for you to find another job?" (1 = not at all difficult, 6 = extremely difficult), and "How stressful do you think it would be for you to find another job?" 1 = not at all stressful, 6 = extremely stressful, $\alpha = .85$.

We also measured a series of control and auxiliary variables, including participants' duration of employment at the former company, the duration of unemployment, the size of the company, former and current income, current job status and demographic variables (for a full list, see Appendix A).

CHAPTER 3: PREFERENCE FOR HUMAN (VS. ROBOTIC) LABOR IS STRONGER IN SYMBOLIC CONSUMPTION CONTEXTS

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, product quality). Moreover, this effect is observed even when a product is 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 et al., 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 vs. 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 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, 2013). 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} = 22.8, students) confirmed that getting a tattoo is perceived as having higher symbolic value than removing one ($M_{get\ tattoo}$ = 5.91, SD = 0.30 vs. $M_{remove\ tattoo}$ = 2.62, SD = 1.78, $t(41) = 11.93$, $p < .0001$; see Appendix B for details regarding all studies' stimuli, measures, and pretests).

Participants (N = 144, 63 female, M_{age} = 20.4, students) were randomly assigned to one of two conditions (service: high vs. low symbolic value; between-participants). In the high symbolic value condition, participants were asked to consider that they wanted to get a new tattoo, 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, $t(142) = 3.65$, $p < .0001$), albeit both means were higher than the scale mid-point 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 Appendix B), 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} = 37.4, MTurk) were randomly assigned to one of four conditions in a 2(design: human vs. algorithm) x 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 2x2 ANOVA on buying intentions revealed a significant main effect of design (M_{human} = 4.35, SD = 2.12 vs. $M_{algorithm}$ = 2.77, SD = 1.99, $F(1, 318) = 47.79$, $p < .0001$), 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, $p < .0001$) 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 3). 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 ($M_{more\ symbolic}$ = 4.39, SD = 2.00 vs. $M_{less\ symbolic}$ = 4.30, SD = 2.26, $F(1, 318) = 0.07$, $p = .788$), but were significantly lower when the poster was designed by an algorithm ($M_{more\ symbolic}$ = 2.31, SD = 1.79 vs. $M_{less\ symbolic}$ = 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.

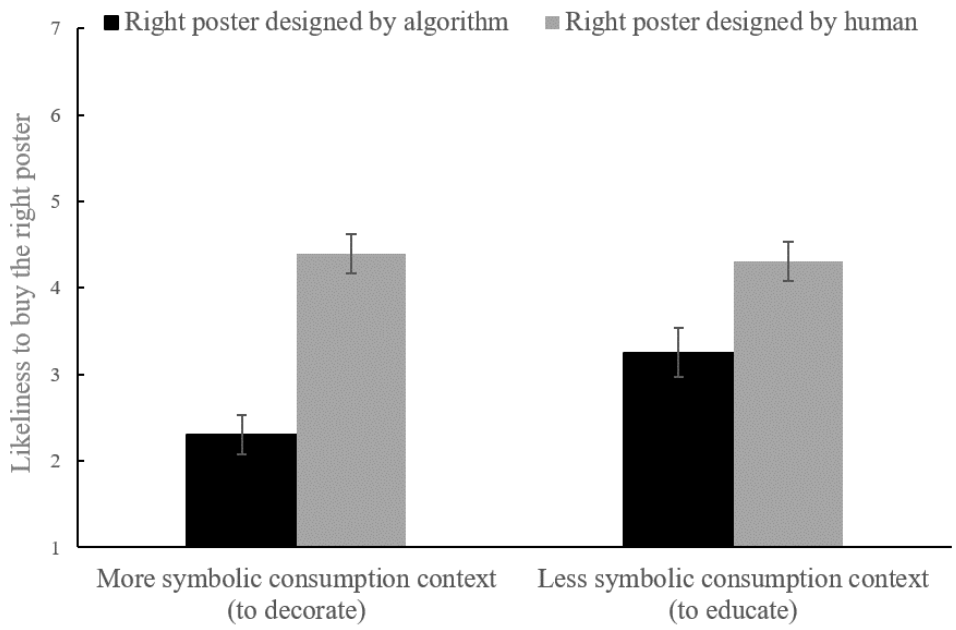

Figure 3. Comparison of the average likeliness to buy the left (=1) versus the right (= 7) printed poster (±SE) across the different conditions in Study 2 (Essay 2).

Study 3

Study 3 aims to replicate the results of Study 2 and test moderation by individual differences in need 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} = 37.2, 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 3). Consistent with our previous results, participants preferred the poster on the right more when it was drawn by a human (vs. robot; b = 1.043, $t(394) = 3.58$, $p < .001$; 95% CI (0.47, 1.62)) and this main

effect of production was qualified by the two-way interaction with consumption context (b = 1.281, $t(394) = 3.09$, $p < .01$; 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 = 2.34 vs. M_{robot} = 2.47, SD = 1.90, $F(1, 398) = 60.27$, $p < .0001$) 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 = 0.724, $t(394) = 2.08$, $p < .05$; 95% CI (0.04, 1.41)). As predicted, the higher participants' need for uniqueness, the more strongly participants preferred the poster drawn by a human (vs. robot) in the more symbolic consumption context. The upper panel of Figure 4 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 & Park (2009), the lower panel of Figure 4 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 ($F(1, 126) = 0.48$, $p = .491$).

Table 3. Regression analysis Study 3 (Essay 2).

	Dependent Variable
	Likeliness to buy the right poster
Production	1.043**
	(0.29)
Consumption context	−0.355
	(0.29)
Need for uniqueness [a]	0.462*
	(0.19)
Production x consumption context	1.281**
	(0.41)
Production x need for uniqueness	−0.210
	(0.26)
Consumption x need for uniqueness	−0.489
	(0.26)
Production x consumption x need for uniqueness	0.724*
	(0.35)
Intercept	2.828**
	(0.21)
Observations	402
R-squared	0.19

Notes: OLS regressions with standard errors in parentheses. * $P < .05$. ** $P < .01$.
[a] Mean-centered

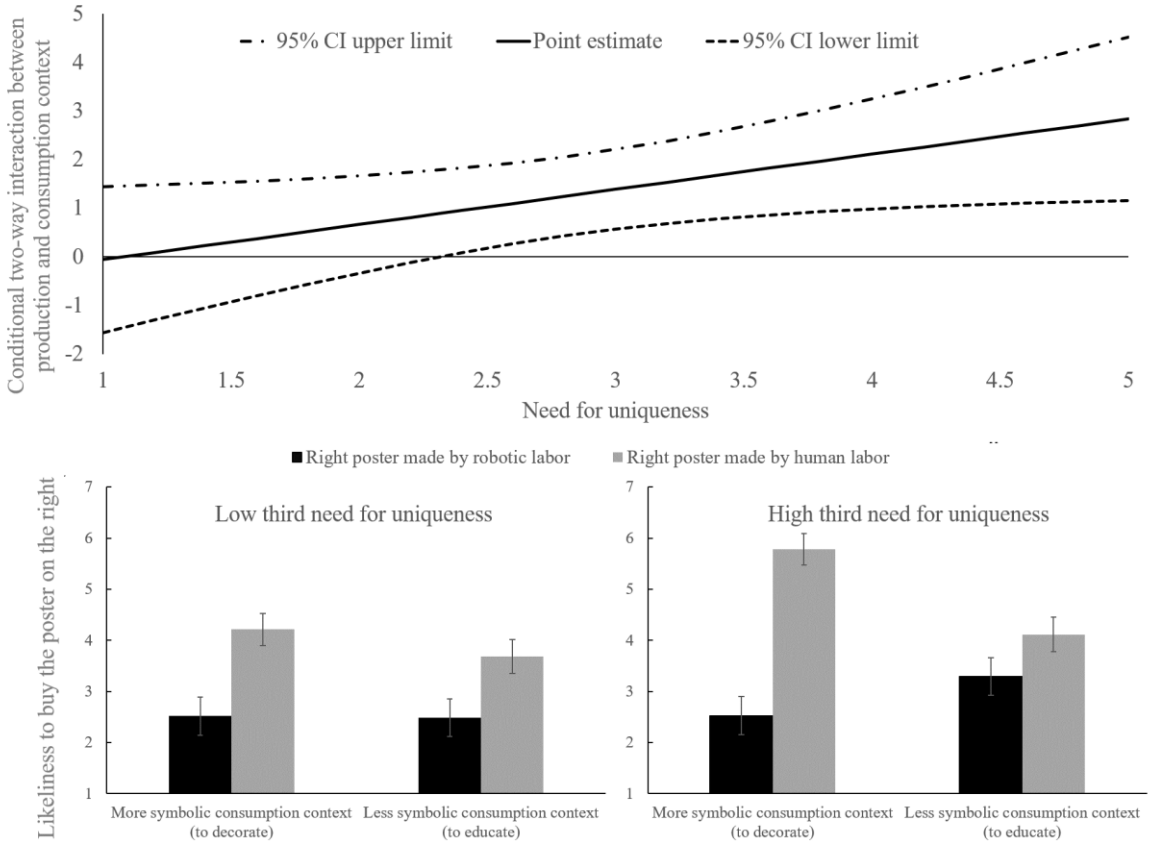

Figure 4. Graphical depiction of the interaction between production mode, symbolic value, and need for uniqueness in Study 3 (Essay 2).
Upper Panel: Conditional two-way interaction between production and consumption context as a function of need for uniqueness.
Lower Panel*:* Comparison of the average 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. high) 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 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 prediction 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} = 22.8, 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 < .0001).

Method

Participants (N = 201, 130 female, M_{age} = 35.1, 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"; α = 0.94; Fuchs & Diamantopoulos 2012). A pretest 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 < .0001; M_{lenses} = 4.99, SD = 1.40, $t(79)_4$ = 6.34, p < .0001).

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

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 ($M_{more\ symbolic} = 4.47$, $t(101)_{3.5} = 5.81$, $p < .0001$), but were indifferent between human and robotic production for lenses ($M_{less\ symbolic} = 3.69$, $t(98)_{3.5} = 0.98$, $p = .331$).

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 ($b = 0.222$, $SE = 0.09$; 95% CI (0.07, 0.42); the confidence interval does not contain *zero*; see Figure 5). 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 ($b = 0.005$, $SE = 0.02$; 95% CI (−0.04, 0.06)), quality ($b = 0.038$, $SE = 0.11$, 95% CI (−0.16, 0.26)),

importance (b = 0.012, SE = 0.03, 95% CI (−0.04, 0.07)), and manufacturing procedures (b = 0.021, 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.

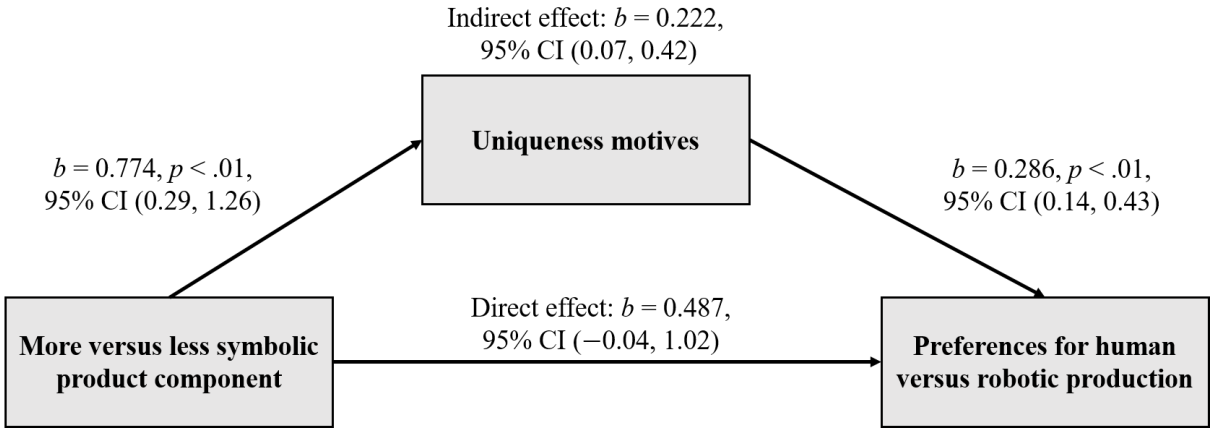

Figure 5. Effect of symbolic product component on preferences for human (vs. robotic) production through uniqueness motives in Study 4 (Essay 2).
Notes: Love, quality, importance, and perceptions of current manufacturing procedures were included as alternative mediator variables. Mediation was tested by calculating 95% CIs using bootstrapping with 10,000 resamples via the PROCESS macro (percentile method).

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 versus robotic labor are 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, 2013). 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. These results suggest that consumers are more likely to reject robotic labor in the case of symbolic products. Future research should investigate other consumption contexts where robotic production is disliked by consumers. Future research could also explore 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 involvement in production activities. Whether in times of rapid technological progress human labor will continue to play a role in production processes depends on cost and efficiency, but also on the consumption context and consumer preferences.

CHAPTER 4: EXPLAINING REACTIONS TO OFFSHORING: A SOCIAL CONTRACT ACCOUNT

In today's competitive and globalized economy, firms are forced to constantly increase the efficiency of their operations. One common way to achieve such efficiency increases is offshoring (Kotabe & Mudambi, 2009), that is, moving domestic production and service jobs abroad. For example, the German carmaker Volkswagen recently announced its plan to cut 5,000 jobs in Germany and move production abroad (Vaughn, 2020), the US manufacturer Caterpillar laid off more than 2,000 workers in Belgium to relocate production to other international sites (Mignon & Hermans, 2016), or the US bank Morgan Stanley aimed to cut costs by $1 billion by relocating work from the US to overseas (Whitehouse, 2016). Research has shown that offshoring decisions have important effects on individual firms (e.g., on their competitiveness; Di Gregorio, Musteen, & Thomas, 2009) and on the overall economy (e.g., on national labor markets; Goos, Manning, & Salomons, 2014). Beyond its economic importance, offshoring, compared to other forms of collective layoffs, seems to evoke particularly strong reactions from consumers and the general public—even if the effects on local employment are comparable (Frey, 2019; Rodrik, 2018). For example, firms that offshore services such as call centers have been shown to face lower customer satisfaction and loyalty ratings (Bharadwaj & Roggeveen, 2008; Grappi, Romani, & Bagozzi, 2013; Whitaker, Krishnan, Fornell, & Morgeson, 2019). Moreover, firms' offshoring decisions affect public opinion and voting behavior substantially more than other collective layoff decisions (Margalit, 2011). It is therefore not surprising that firms that offshore domestic jobs have been publicly criticized in all US presidential campaigns since 2004, by both Democratic (e.g., Barack Obama) and Republican (e.g., Donald Trump) candidates.

Despite the importance of firms' offshoring decisions for consumers and society at large, it remains unclear *why* firms face such strong negative reactions when they collectively lay off workers due to offshoring. What makes moving domestic work abroad psychologically

different from other reasons for collective layoffs that involve comparable reductions of the domestic labor force?

In this research, we provide a theoretical account to explain these strong reactions towards firms that offshore their production. We theorize and empirically document that consumers' reactions to offshoring can be understood within a framework of social contracts, which are tacit agreements about generally understood standards of behaviors between firms and their surrounding community (e.g., Donaldson, 1982; Dunfee, Smith, & Ross Jr., 1999). Specifically, we propose that consumers react more negatively to firms that offshore production compared to other strategies that involve collective layoffs, even if the number of domestic workers losing their job is the same. We argue that this is because offshoring violates a key element of social contracts: the normative expectation that firms support the local community and thus promote and commit to local production. Based on our social contract account, we further theorize that this negative effect of offshoring should—counterintuitively—be stronger when the offshoring firm is a domestic firm as opposed to a foreign firm. While a large body of literature in international marketing has documented that consumers hold more positive attitudes towards domestic (vs. foreign) firms ("home country bias"; Sharma, 2011, 2015; Verlegh, 2007), our social contract account proposes a reversal of this effect, whereby offshoring decisions by domestic firms receive more negative responses than those by foreign ones. We posit that this effect arises because social contracts primarily run between a community and domestic firms: consumers perceive domestic (vs. foreign) firms to have a higher moral obligation to promote domestic (vs. foreign) employment.

We tested the key predictions of our social contract account across five studies, where we used different participant populations, stimuli, measures, designs, and, controlling for the number of domestic job losses, four different baseline conditions: outsourcing, relocation, declining demand, or automation. In Study 1, we analyzed a dataset on collective layoffs in the European Union from 2002 to 2018. Our analysis provides initial evidence that firms'

collective layoff announcements attract more negative reactions from the public in the case of offshoring (where production is relocated to another country) than in the case of outsourcing or relocation (where production remains in the same country). In Study 2, we validate this negative effect of offshoring (relative to outsourcing or relocation) in an experimental setting with consumers. We further conducted three experimental studies to test whether reactions to offshoring can be understood within our social contract account. In Study 3, we document that the negative effect of offshoring decreases when most customers of a firm are foreign than when they are domestic, as in the former case offshoring is perceived less of a social contract violation. In Studies 4A and 4B, we further demonstrate that the negative effect of offshoring depends on the origin of the firm, supporting our argumentation that social contracts are more stringent in the case of domestic firms.

Our research makes four main contributions. First, we establish a theoretical account to better understand psychological reactions to offshoring—one of the most controversial and politicized aspects of globalization (Owen, 2017). Our social contract account explains *why* and predicts *when* consumers react more negatively to collective layoffs that result from offshoring compared to collective layoffs that result from other reasons. Specifically, we demonstrate that consumers react negatively to firms' offshoring decisions because they perceive that the offshoring firm violates a social contract.

Second, we contribute to the literature on social contracts by providing a better understanding of social contract violations—and on which factors these violations depend (e.g., whether most customers are domestic versus foreign). Our research also provides new insights into the formation of social contracts and its antecedents (e.g., whether the firm is domestic or foreign), an understudied aspect in social contract theory (Thompson & Hart, 2006) and in marketing research (Montgomery et al. 2017). Moreover, we demonstrate that our social contract account offers a more nuanced theoretical understanding of how consumers respond to firm decisions in the context of collective layoffs, a phenomenon that

has a substantial impact on the customer-firm relationship and that poses various challenges to marketers (e.g., Landsman & Stremersch, 2020).

Third, we contribute to the literature on home country bias by showing that the well-documented positive bias towards domestic firm can, in certain contexts, reverse and harm domestic firms. While it is well established in the literature that consumers generally have more positive attitudes towards domestic (vs. foreign) firms and their products (i.e., domestic or "home" country bias; Sharma, 2011, 2015; Verlegh, 2007), we show that in the case of offshoring this positive home country bias not only diminishes but even reverses (see also Klein, Ettenson, & Krishnan, 2006). The implicit social contract between firms and their surrounding community means that offshoring production can harm domestic firms more than foreign firms.

Fourth, we contribute to the managerial discourse on the consequences of offshoring decisions. Prior research has identified the positive economic consequences of offshoring, such as increased efficiency (Kotabe & Mudambi, 2009). Our research suggests that firms should not only consider such supply-side arguments, but also reputation-based, demand-side consequences of offshoring. For example, our research suggests that firms should anticipate that the "stronger" the social contract between them and their surrounding community is, the more negatively offshoring decisions may affect consumers' attitudes towards them.

Conceptual Development

Offshoring, moving domestic production and service jobs abroad (Brown & Siegel, 2004), is a widely applied business practice (Contractor, Kumar, Kundu, & Pedersen, 2010). This practice has significant effects on the overall economy; for example, offshoring has been shown to affect national labor markets (Goos et al., 2014) and wages (cf., Hummels, Munch, & Xiang, 2018). A large body of research has documented positive effects of offshoring on individual firms; for example, research has shown how offshoring can help firms to become

more efficient (Doh, Bunyaratavej, & Hahn, 2009; Farrell, 2005; Ramamurti, 2004), more innovative (Nieto & Rodríguez, 2011), and more globally competitive (Di Gregorio et al., 2009). However, research suggests that firms might also face substantial negative consequences when they decide to offshore. Investors and customers tend to evaluate offshoring more negatively than relocation within national boundaries because of concerns about product quality and data security (Robertson, Lamin, & Livanis, 2010). Customers of firms oppose that services are offshored because of concerns about deterioration of service quality (Bharadwaj & Roggeveen, 2008; Whitaker et al., 2019) or concerns about free trade and communication barriers (Thelen, Yoo, & Magnini, 2011). Grappi and colleagues (2013) find that consumers view firms and their morals more negatively when domestic firms move their production and design functions abroad. Yet, this study remains inconclusive on the crucial issue of whether the negative effect of offshoring is caused by the circumstance in which domestic workers lose their jobs (vs. job losses in general), because in the study the effect of offshoring is confounded with the negative effect of laying off domestic workers.

Compared to other instances that involve collective layoffs, offshoring can also trigger strong and negative reactions among employees and the general public (e.g., voters). For example, in response to the firm's offshoring practices, 40,000 Verizon employees organized one of the largest strikes of recent years (Goldman & Smith, 2016). Offshoring can also affect voters' political preferences and, thus, election outcomes: Margalit (2011), for example, finds that US voters are particularly sensitive to local job losses and punish incumbents when local firms offshore. Yet, it remains unclear what drives these strong negative public reactions. Why does the public—individuals or consumers—seem to react particularly negatively when firms lay off domestic workers due to offshoring compared to when they lay off domestic workers due to other decisions such as outsourcing or automation—even if they have comparable effects on local employment (Frey, 2019; Rodrik, 2018)?

Social Contract Theory

A promise is more than a mere statement; if one party makes a promise to another, then this party is expected—and morally obliged—to keep that promise (e.g., Habib, 2014; Kant, 1990/1785; Raz, 1981). The notion of promise is central to contracts. For example, in US law an enforceable promise is referred to as a legal contract (Shiffrin, 2007). Society does not rely only on legal contracts but also on social contracts, which are implicit promises and agreements that exchange parties should respect (e.g., Donaldson, 1982; J.-J. Rousseau, 1997/1762). In contrast to legal contracts, social contracts cannot be enforced and are not legally binding. This does not mean that social contracts are not powerful. In political philosophy, social contracts have been one of the most influential perspectives used to describe what people expect from authorities and vice versa (Hobbes, 1998/1642; Kant, 1990/1785; Locke, 2014/1689; Rawls, 2009; J.-J. Rousseau, 1997/1762). In business ethics, the idea of social contracts has been applied to define what people—individuals or consumers—expect from firms within a community and vice versa (e.g., Donaldson, 1982; Dunfee et al., 1999). Firms expect the community (the social unit in which the firm is embedded) to provide a functioning infrastructure, such as housing for employees, qualified labor, and generally to support them by, for example, buying their products. The community, in turn, expects firms to pay taxes, invest in the area, and provide work opportunities (Donaldson, 1982). Thus, social contracts specify what consumers conceive as fair and appropriate standards of behaviors of both firms and society. Failing to meet these unwritten standards of behavior—and thus violating the social contract—has, for example, been shown to evoke feelings of betrayal or anger among employees (Morrison & Robinson, 1997; D. M. Rousseau, 1989).

Social Contracts and Offshoring

We propose that consumers view collective layoffs as a social contract violation, especially when those layoffs are the consequence of an offshoring decision. Specifically, we propose that offshoring violates the normative expectation of consumers that firms, which can only thrive through the commitment of the community, support this community by providing jobs (Donaldson, 1982). Social contracts can exist between entities (e.g., firms, governments) and *communities* ranging from the level of small groups of people (e.g., Donaldson & Dunfee, 1994) to humankind as a whole (e.g., Gibbons, 1999). In a world dominated by nation states, we argue that hearing about jobs moving to far-away places should emphasize a sense of community at the country level (and thus people should feel that their community is, for example, the American people; e.g., Anderson, 2006). Since offshoring means moving jobs to a foreign country, it not only reduces domestic employment opportunities (like other forms of collective layoffs also do), but replaces local workers with foreign ones (e.g., American workers with non-American workers). This notion of offshoring as direct replacement is crucial for at least two reasons. First, replacing local workers with foreign workers preserves the scope of the firm's activity, making the decision harder for the community to tolerate (e.g., making the decision harder to justify based on a proactive change in strategic focus or general retrenchment; P. M. Lee, 1997). Second, replacing local workers with foreign workers should be especially likely to trigger negative social comparisons. For example, Granulo, Fuchs, and Puntoni (2019) show that workers find being replaced by other human workers to be more threatening to the self than being replaced by robots. Compared to other layoff reasons, consumers should therefore perceive offshoring as a particular strong violation of acceptable corporate behavior—and react more negatively towards offshoring firms. For example, firm attitudes, which are a critical predictor of consumer boycotts (Klein, Smith, & John, 2004), sales (e.g., Fazio & Petty, 2008), stock returns and financial performance (Aaker & Jacobson, 2001), should decrease more in the case of offshoring than in the case of other collective

layoffs (e.g., Love & Kraatz, 2009; Subramony & Holtom, 2012). In sum, we predict that offshoring engenders more negative reactions towards firms than other reasons for collective layoffs (where production is not relocated to another country). Formally,

> **H_1:** Reactions to collective layoff announcements are more negative when they are associated to offshoring compared to other layoff strategies.

If perceived social contract violations underlie the negative effect of offshoring, we should further expect that the extent to which offshoring leads to negative consumer reactions depends on the strength of the social contract. The strength of the social contract—and the moral obligations resulting from it—depends on the exchange relationship between local firms and their community (Donaldson, 1982). Thus, both supply-side and demand-side factors should influence the severity of perceived breaches. Below, we theorize two variables affecting the intensity of negative reactions to offshoring, one focused on demand-side factors and one on supply-side factors to assess the explanatory power of our social contract account.

Customer Base as an Antecedent of Social Contracts

Social contracts set expectations about the behavior of both firms and community. Firms should support the community, for example, by creating domestic jobs. In exchange, the community should also support local firms. The most common and easiest way for the community to support a firm is to buy their products or services (Guo, Gruen, & Tang, 2017). If the community fails to fulfill this expectation, consumers should perceive the resulting social contract as weaker. Based on this reasoning, we argue that firms' perceived obligations emanating from the social contract should depend on the location of their main customer base. If most customers are abroad (vs. domestic), the perceived social contract obligations of the firm should be weaker as the community violates the idea of reciprocity of the social contract

(D. M. Rousseau, 1989); this, in turn, should make consumers perceive offshoring as a less egregious social contract violation. Formally,

H_2: Consumer reactions to collective layoffs due to offshoring are more negative when most customers are domestic versus foreign.

Firm Headquarter as an Antecedent of Social Contracts

A large body of research documents that the country of origin of a firm has important economic effects—and that these effects are positive for domestic versus foreign firms. For example, consumers prefer domestic to foreign products (e.g., Peterson & Jolibert, 1995; Verlegh & Steenkamp, 1999); investors favor domestic over foreign assets (e.g., Chan, Covrig, & Ng, 2005; French & Poterba, 1991); and the share of domestic versus international trade of goods and services is much larger than what normative trade models would suggest (Nitsch, 2000; Wolf, 2000). Based on our social contract account, however, we posit that this positive "home country" bias (Sharma, 2011, 2015; Verlegh, 2007) should reverse in the context of offshoring. Specifically, we argue that a social contract should be stronger between local firms and the local community (see above; e.g., Donaldson, 1982). For example, US citizens should be more likely to perceive US firms (i.e., firms with their corporate headquarter in the US) to be part of the same community than foreign firms (i.e., firms with their corporate headquarter not in the US). Although firms can move their corporate headquarter from one country to another (Birkinshaw, Braunerhjelm, Holm, & Terjesen, 2006), we focus on the typical case in which a firm's headquarter has stayed in the same community (i.e., country). Consumers should perceive that domestic firms have a stronger social contract with their community than foreign firms, for which less long-term oriented and more transactional relationships may be expected. As a result, we theorize that consumers primarily expect domestic (vs. foreign) firms to promote domestic (vs. foreign) production;

therefore, consumers should react particularly negatively when a domestic (vs. foreign) firm lays off workers and moves production to another country. Formally,

> **H_3:** Consumer reactions to collective layoffs due to offshoring are more negative when the firm's headquarter is domestic versus foreign.

We tested our predictions in a series of five studies. Detailed materials can be found in the Appendix C. Moreover, the complete stimulus materials and data are made openly available in the Open Science Framework.

Study 1

Study 1 aims to explore whether public opinion of firms' collective layoff announcements is more negative when collective layoffs are associated to offshoring compared to other reasons for layoff. Specifically, we examine whether firms' collective layoff announcements receive more negative reactions in public media in the case of offshoring than in the case of collective layoffs where production remains in the same country. Building on previous research, we use media coverage as a proxy for public opinion: media coverage shapes (e.g., Happer & Philo, 2013; McCombs, 2014) and reflects public opinion (e.g., Erikson & Tedin, 2015; Hopkins, Kim, & Kim, 2017).

Method

We analyzed the sentiment of press coverage of collective layoff announcements. We obtained the data from the European Monitoring Center of Change (Eurofound, 2018). The European Monitoring Center defines collective layoffs to involve the destruction of at least 100 jobs, or affect 10% of the workforce at sites employing more than 250 people, and hosts a database on such layoff announcements in all countries of the European Union from 2002 to 2018 (N = 23,189). This database includes the reason for the collective layoff (e.g.,

offshoring), quantitative characteristics of the collective layoff (e.g., the number of job losses announced), and text-based summaries of available media coverage on the collective layoff (e.g., newspaper articles on why the layoffs occurred, on reactions of labor unions, and other consequences of the announcement). These textual summaries are generated by Eurofound correspondents and are based on the content from a broad range of daily press and online sources (see Appendix C for a concrete example).

To obtain data on collective layoffs where firms relocated production to a another country versus kept production in the same country, we extracted all cases from this dataset that were attributed to (i) offshoring (i.e., layoffs where production is relocated to another country; $N = 881$), (ii) outsourcing (i.e., layoffs where production is subcontracted to another company but remains in the same country; $N = 102$), and (iii) relocation (i.e., layoffs where production remains in the same company and in the same country; $N = 279$). We created three dummy variables to capture whether the firms' collective layoff was due to offshoring, outsourcing, and relocation, which serve as our independent variables. It is worth noting that outsourcing and relocation may also produce perceptions of social contract violations in the immediate community. However, we argue that these negative reactions should be more intense and widespread in the case of offshoring.

To measure the valence and intensity of these three types of collective layoff, we extracted a sentiment score from the (textual) media coverage summary of each collective layoff event using VADER (Valence Aware Dictionary and sEntiment Reasoner; Hutto & Gilbert, 2014). VADER is a text-parsing Python algorithm that captures the sentiment of online conversations with an accuracy of above 80%, higher than the accuracy of other algorithms (e.g., LIWC). The sentiment score indicates how negative or positive the sentiment of the media coverage of each layoff case was (ranging from -1 to $+1$) and served as our dependent variable.

Results

The sentiment score of media coverage, our proxy for the intensity of public reactions to collective layoffs, was significantly more negative when the firms' collective layoffs were due to offshoring ($M = -.11$, $SD = .50$) than when they were due to outsourcing ($M = .06$, $SD = .53$; $t(981) = -3.21$, $p = .001$, Cohen's $d = -.34$; 95% CI = [−.54, −.13]) or due to relocation ($M = -.01$, $SD = .51$; $t(158) = -2.86$, $p = .004$; Cohen's $d = -.20$; 95% CI = [−.33, −.06]). In contrast, we found no significant difference when the firms' collective layoffs were due to outsourcing versus relocation ($t(379) = 1.17$, $p = .242$, Cohen's $d = .14$; 95% CI = [−.09, .36]). To examine this pattern of results in more detail, we estimated four OLS regression models with sentiment of media coverage as the dependent variable (see Table 4). Each model controls for an increasing number of factors. Model 1 controls for the number of announced layoffs; Model 2 also controls for occupational sector (i.e., in which sector the job losses occurred); Model 3 also controls for the number of words in the qualitative layoff description; and Model 4 also controls for the year in which the layoffs were announced and the country where the layoffs took place.

Across Models 1-3, we found significant and positive coefficients for both outsourcing (Model 1: $b = .150$, $p = .005$, 95% CI = [.05, .25]; Model 2: $b = .147$, $p = .011$, 95% CI = [.03, .26]; Model 3: $b = .146$, $p = .011$, 95% CI = [.03, .26]) and relocation (Model 1: $b = .084$, $p = .018$, 95% CI = [.02, .15]; Model 2: $b = .076$, $p = .034$, 95% CI = [.01, .15]; Model 3: $b = .078$, $p = .029$, 95% CI = [.01, .15]); that is, the estimated sentiment score of the media coverage was significantly less negative when the firms' collective layoffs were due to outsourcing or relocation than when they were due to offshoring. In Model 4, we found the same pattern; but while the coefficient of outsourcing remained significant ($b = .130$, $p = .024$, 95% CI = [.02, .24]), that for relocation was directional but non-significant ($b = .055$, $p = .133$, 95% CI = [−.02, .13]).

Table 4. Regression models of sentiment score of media coverage in Study 1 (Essay 3).

Predictors	Sentiment Score of Media Coverage			
	Model 1	Model 2	Model 3	Model 4
Outsourcing[a]	.150	.147	.146	.130
	(.053)	(.058)	(.057)	(.057)
	[.005]	[.011]	[.011]	[.024]
Relocation[a]	.084	.076	.078	.055
	(.035)	(.036)	(.036)	(.036)
	[.018]	[.034]	[.029]	[.133]
Number of announced layoffs	.001	.001	.000	.000
	(.000)	(.000)	(.000)	(.000)
	[.032]	[.034]	[.068]	[.550]
Number of words in the qualitative layoff description			.001	.001
			(.000)	(.000)
			[.000]	[.002]
Constant	−.124	−.042	−.136	.066
	(.019)	(.097)	(.099)	(.164)
	[.000]	[.664]	[.171]	[.689]
Occupational sector	No	Yes	Yes	Yes
Year	No	No	No	Yes
Country	No	No	No	Yes
Observations	1243	1243	1243	1243
R-squared	.01	.03	.05	.13

Notes: Standard errors in parentheses; *p*-values (two-tailed) in squared brackets.
[a] Outsourcing and relocation dummies are to be interpreted as relative differences to the category offshoring.

In sum, the correlational findings of Study 1 are consistent with the notion that firms' collective layoff announcements due to offshoring trigger more negative public opinion than other collective layoff announcements (outsourcing and relocation within the country). While our dependent variable is a proxy for public opinion, our analysis provides initial real-world evidence that media reports on collective layoffs differ depending on whether production is moved to another country or not. We do this relying on a dataset that covers over a decade of large-scale restructuring activity in Europe, including a large set of control variables. In sum,

the correlational findings of Study 1 are consistent with the notion that firms' collective layoff announcements due to offshoring trigger more negative public opinion than other collective layoff announcements (outsourcing and relocation within the country). While our dependent variable is a proxy for public opinion, our analysis provides initial real-world evidence that media reports on collective layoffs differ depending on whether production is moved to another country or not. We do this relying on a dataset that covers over a decade of large-scale restructuring activity in Europe, including a large set of control variables. However, this study has two main limitations. First, it does not allow us to directly observe individual consumer reactions to layoff announcements but only an aggregate-level proxy (i.e., media coverage). Second, it does not allow us to draw causal conclusions on how firms' collective layoff decisions affect the attitude of consumers towards the firm. To address these issues, we employed randomized controlled experiments in subsequent studies.

Study 2

The main aim of Study 2 is to experimentally replicate the findings of Study 1 and provide causal evidence that consumers react more negatively to collective layoff announcements due to offshoring than due to outsourcing or relocation (Hypothesis 1)—even if the number of domestic job losses is the same. We presented participants with a media article about a layoff announcement, experimentally varied across participants the justification provided in the article for the layoff decision, and subsequently asked them to rate their attitude toward the firm. We preregistered the hypotheses and study characteristics (see https://aspredicted.org/blind.php?x=ja4iu4). In this and all other experiments, we report all measures, conditions, and participant exclusions (if any). Sample sizes were predetermined based on pilot tests and/or power calculations.

Method

We recruited 601 UK consumers (M_{age} = 35 years, 35% female) via an online consumer panel (Prolific) in exchange for payment and randomly assigned them to one of three experimental conditions in a between-participants design (collective layoff reason: offshoring vs. outsourcing vs. relocation). All participants received a news release, which introduced the fictitious UK firm Magan's, a large manufacturer of seeds and other gardening products, and provided further details on the firm, including its founding year, number of employees, and annual revenue (see Appendix C for full text). In all conditions, participants read that this UK firm had announced that they would shut down its main production plant in Manchester and lay off 4,000 workers. In the offshoring condition (N = 201), participants read that the firm would open a new factory abroad, and thus production would move to a foreign country. In the outsourcing condition (N = 200) and the relocation condition (N = 200), participants read that the firm would instead hire a contractor in the UK or open a new factory in the UK, respectively, and thus production would remain in the UK. Next, participants indicated their attitude toward the firm on three items using a seven-point scale (A. Y. Lee & Aaker, 2004; "My overall impression of the firm described is…" "bad/good," "unfavorable/favorable," "negative/positive"; α = .97). Finally, we measured demographic variables including age and gender.

Results

A one-way ANOVA on attitude toward the firm indicates significant differences across conditions (F(2, 598) = 33.02, p < .001, η^2 = .10; 95% CI = [.06, .15]). Consistent with the results of Study 1, participants rated the firm significantly lower in terms of attitudes when collective layoffs were due to offshoring ($M_{offshoring}$ = 2.75, SD = 1.31) compared to when they were due to outsourcing ($M_{outsourcing}$ = 3.46, SD = 1.23; t(598) = −5.57, p < .001, Cohen's d = −.56; 95% CI = [−.76, −.36]) or due to relocation ($M_{relocation}$ = 3.76, SD = 1.28; t(598) = −7.91,

$p < .001$, Cohen's $d = -.78$; 95% CI = [−.98, −.57]). We also find that participants rated the firm significantly lower when collective layoffs were due to outsourcing ($M_{outsourcing} = 3.46$, $SD = 1.23$) compared to when they were due to relocation ($M_{relocation} = 3.76$, $SD = 1.28$; $t(598) = -2.34$, $p = .020$, Cohen's $d = -.24$; 95% CI = [−.43, −.04]).

These experimental findings, together with the correlational findings of Study 1, provide converging evidence in support of Hypothesis 1 that individuals react more negatively to collective layoff announcements due to offshoring than due to outsourcing or within-country relocation. Specifically, the experimental findings of Study 2 suggest that offshoring considerably harms consumers' firm attitudes.

Study 3

The main aim of Study 3 is to test our prediction that the negative effect of offshoring should depend on whether most of the firm's existing customers are situated in the firm's home country or in a foreign country (Hypothesis 2). If, as we argued, perceived social contract violations underlie the negative effect of offshoring, the effect should be reduced when most customers are foreign; in this case, consumers' normative expectations that local firms support the local community should be weaker, and offshoring should be perceived as a less egregious social contract violation. As in Study 2, our main dependent variable is attitude toward the firm. In addition, we also measured the extent to which participants believed the firm's decision to move production offshore to be a social contract violation (details on the measure below). This additional measure allows us to validate our prediction that consumer responses to offshoring are mediated by perceptions of social contract violation.

Method

We recruited 303 UK consumers ($M_{age} = 34$ years, 28% female,) via Prolific in exchange for payment and randomly assigned them to one of three experimental conditions in

a between-participants design (customer location: foreign vs. domestic vs. control). All participants first read the same description about the UK firm from the offshoring condition of Study 2. Thus, differently from Study 2, in all conditions participants read the description of a firm that decided to offshore jobs abroad. Moreover, we added a short description about the customer base of the firm, which was our manipulation. In the foreign customer location condition (N = 101), participants read that more than 90% of the firm's customers were not from the UK. In the domestic customer location condition (N = 100), participants read that more than 90% of the firm's customers were from the UK. In the control condition (N = 102), participants instead received no information about the firm's customer base.

As our dependent variable, we first measured participants' attitude toward the firm using the same measure as in Study 2 (α = .98; Becker-Olsen, 2003). As a process variable, we subsequently measured the extent to which participants perceived the collective layoffs as a social contract violation with three Likert items ("The firm is breaking an unwritten rule of acceptable behavior," "The action by this firm is not what most people would expect from it," "The firm is violating a social norm"; 1 = strongly disagree, 7 = strongly agree; α = .77). We derived these three items based on the core elements of the definition of social contracts (Donaldson, 1982; Dunfee et al., 1999; Wempe, 2008); specifically, these core elements are that social contracts are defined to be unwritten agreements about acceptable behavior (item 1), specify how firms are expected to act (item 2), and underlie norms that are collectively understood (item 3). Finally, we measured demographic variables including age and gender.

Results

A one-way ANOVA indicates that the negative effect of offshoring on participants' firm attitude depends on the customer location ($F(2, 300) = 14.28$, $p < .001$, $\eta^2 = .09$; 95% CI = [.03, .15]). As expected, participants rated the offshoring firm less negatively in the foreign customer location condition (i.e., when most customers were foreign; $M_{foreign} = 3.68$, SD =

1.22) than in the domestic customer location condition (i.e., when most customers were domestic; $M_{domestic}$ = 2.81, *SD* = 1.42; *t*(300) = 4.53, *p* < .001, Cohen's *d* = .66; 95% CI = [.37, .94]) or the control condition (i.e., when participants received no information about the location of customers; $M_{control}$ = 2.78, *SD* = 1.43; *t*(300) = 4.72, *p* < .001, Cohen's *d* = .68; 95% CI = [.39, .96]). We found no significant difference between the latter two conditions (*t*(300) = .16, *p* = .873, Cohen's *d* = .02; 95% CI = [−.25, .30]).

We next tested whether the effect of customer location (explanatory variable) on firm attitude (dependent variable) can be explained by perceived social contract violations (mediator variable). The mediation model (based on 10,000 bootstrap samples; Figure 6) revealed that perceived social contract violations can explain why participants rated the offshoring firm less negatively in the foreign customer location condition than in the domestic customer location condition (*b* = −.417, *SE* = .09; 95% CI = [−.62, −.25]) or than in the control condition (*b* = −.191, *SE* = .09; 95% CI = [−.38, −.02]); none of the confidence intervals contain *zero*). That is, participants perceived that offshoring violated the social contract less when most customers were foreign ($M_{foreign}$ = 4.02, *SD* = 1.21) than when most customers were domestic ($M_{domestic}$ = 4.82, *SD* = 1.22; *t*(300) = −4.50, *p* < .001, Cohen's *d* = −.66; 95% CI = [−.94, −.37]) or when no information about the customer location was provided ($M_{control}$ = 4.38, *SD* = 1.34; *t*(300) = −2.07, *p* = .039, Cohen's *d* = −.29; 95% CI = [−.56, −.01]), which, in turn, drove participants' attitude toward the offshoring firm.

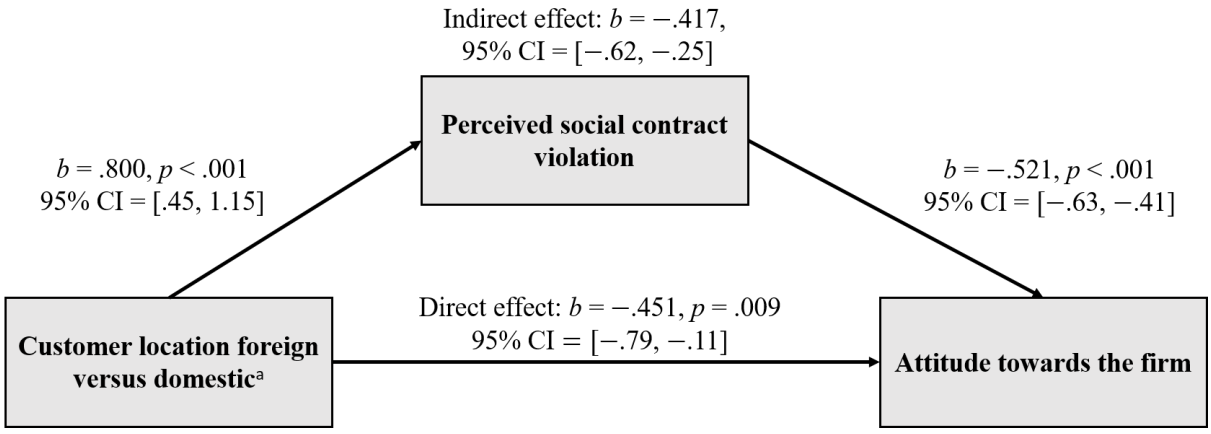

Figure 6. Effect of customer location on attitude towards the firm through perceived social contract violations in Study 3 (Essay 3).
Notes: [a]Customer location coded as 0 = foreign, 1 = domestic
Mediation was tested by calculating 95% CIs using bootstrapping with 10,000 resamples via the PROCESS macro (percentile method).

Study 4A

The main aim of Studies 4A and 4B is to test the role of the firm's country of origin in moderating the negative effect of offshoring (Hypothesis 3). Specifically, we test whether collective layoffs due to offshoring lead to more negative reactions when a firm is domestic (i.e., headquartered in the country) than when a firm is foreign (i.e., headquartered abroad). To test this prediction, we contrast collective layoffs due to offshoring to collective layoffs due to declining demand (Study 4A), and to collective layoffs due to automation (Study 4B). Research indicates that both offshoring and declining demand represent frequent reasons for collective layoffs that can affect a substantial part of the labor force (Brown & Siegel, 2004; Landsman & Stremersch, 2020; US Bureau of Labor Statistics, 2012).

Method

We recruited 327 US consumers (M_{age} = 37 years, 47% female) via the online panel MTurk in exchange for payment and randomly assigned them to one of four conditions in a 2(layoff reason: offshoring vs. declining demand) x 2(firm country of origin: domestic vs. foreign firm) between-participants design. In all conditions, participants read the description

of a large manufacturer of industrial goods. The firm's main production location was in the US. To manipulate the firm's country of origin, the firm's headquarter was described as either being in the US (i.e., domestic) or Germany (i.e., foreign).

In the offshoring condition, participants read that the firm had recently decided to move its main production overseas. Participants further read that the firm plans to open a new production plant abroad and to rely exclusively on work done by foreign workers. In the declining demand condition, participants read that the firm had recently decided to keep its main production in the US. Participants further read that the firm plans to restructure its existing production plant in the US as it is facing a severe drop in sales. In all conditions, participants were informed that because of the firm's restructuring process, the firm will lay off 2,000 workers in its US plant. After reading the manipulations, we measured firm attitudes as in the previous studies (α = .96; Becker-Olsen, 2003)Finally, we measured sociodemographic variables including age, gender, political orientation, education, and income.

Results

A two-way ANOVA on attitude toward the firm revealed a main effect of reason for the collective layoff. Replicating the findings of Studies 1 and 2 using a different control condition, participants rated the firm more negatively when the reason for the collective layoff was offshoring (M = 2.75, SD = 1.34) than when it was declining demand (M = 3.91, SD = 1.31, $F(1,323) = 62.34$, $p < .001$, $\eta^2 = .16$; 95% CI = [.10, .24]). We observed no main effect of the firm's country of origin ($F(1,323) = 1.03$, $p = .371$, $\eta^2 = .00$; 95% CI = [.00, .15]), but a marginally significant two-way interaction effect ($F(1, 323) = 3.45$, $p = .064$, $\eta^2 = .01$; 95% CI = [.00, .04]; Figure 7).

As expected, the negative effect of offshoring was significantly stronger when the firm's headquarter was domestic (vs. foreign); that is, participants rated the offshoring firm

significantly more negatively in the domestic firm condition ($M_{domestic}$ = 2.54, *SD* = 1.40) than in the foreign firm condition ($M_{foreign}$ = 2.96, *SD* = 1.26; *F*(1, 323) = 4.11, *p* = .044, Cohen's *d* = −.32; 95% CI = [−.62, −.01]). In contrast, participants did not rate a domestic (vs. foreign) firm significantly differently when it laid off its workers due to declining demand ($M_{domestic}$ = 3.97, *SD* = 1.37 vs. $M_{foreign}$ = 3.85, *SD* = 1.26; *F*(1, 323) = .36, *p* = .550, Cohen's *d* = .09; 95% CI = [−.21, .40]).

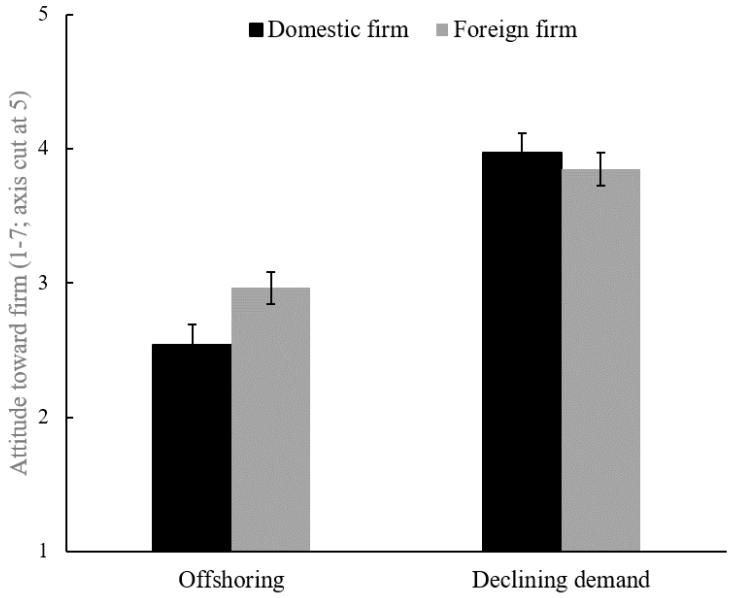

Figure 7. Interaction of firm country of origin and layoff reason in Study 4A (Essay 3).

Study 4B

The main aim of Study 4B is to again test the role of the firm's country of origin in moderating the negative effect of offshoring, this time contrasting collective layoffs due to offshoring to another reason for collective layoffs: automation. Offshoring and automation, which can substitute domestic labor, are two of the most important strategies to increase operational efficiency (e.g, Rodrik, 2018), can affect workers with similar skillsets (e.g., Autor & Dorn, 2013; Goos et al., 2014), and are often in direct competition to each other (with automation becoming increasingly important; Brynjolfsson & McAfee, 2014).

Method

We recruited 541 US participants (M_{age} = 37 years, 56% female) via MTurk in exchange for payment. We employed a 2(layoff reason: offshoring vs. automation) x 2(firm country of origin: domestic vs. foreign firm) between-participants design. The firm description and the country of origin manipulation were the same as in Study 4A. In the layoff due to automation condition, participants read that the firm had recently decided to keep its main production in the US. Participants further read that the firm plans to convert its existing production plant in the US and rely exclusively on automated work done by machines. The offshoring condition was similar to that used in Study 4A. In all conditions, participants were informed that, as a result of the firm's restructuring process, the firm will lay off 4,000 workers in its US plant. After reading the manipulations, we measured firm attitude as in Study 4A (α = .96; Becker-Olsen, 2003). Finally, we measured sociodemographic variables including age, gender, income, and education.

Results

A two-way ANOVA on attitude toward the firm revealed a main effect of reason for the collective layoff. Replicating the results of Study 4A using a different control condition, participants rated the firm more negatively when the reason for the collective layoff was offshoring (M = 2.63; SD = 1.40) than when it was automation (M = 2.93, SD = 1.44; $F(1,537) = 5.81$, $p = .016$, $\eta^2 = .01$; 95% CI = [.00, .03]). We observed no main effect of the firm's country of origin ($F(1,537) = 1.78$, $p = .183$, $\eta^2 = .00$; 95% CI = [.00, .02]), but a significant two-way interaction effect ($F(1, 537) = 3.91$, $p = .048$, $\eta^2 = .01$; 95% CI = [.00, .03]; Figure 8).

As expected, the negative effect of offshoring was significantly stronger when the firm's headquarter was domestic (vs. foreign); that is, participants rated the offshoring firm significantly more negatively in the domestic firm condition ($M_{domestic}$ = 2.43, SD = 1.29) than

in the foreign firm condition ($M_{foreign}$ = 2.83, *SD* = 1.49; $F(1, 537) = 5.52$, $p = .019$, Cohen's $d = -.29$; 95% CI = [−.53, −.05]). In contrast, participants did not rate a domestic (vs. foreign) firm significantly differently when it laid off its workers due to automation ($M_{domestic}$ = 2.97, *SD* = 1.53 vs. $M_{foreign}$ = 2.89, *SD* = 1.35; $F(1, 537) = .21$, $p = .650$, Cohen's $d = .05$; 95% CI = [−.18, .29]).

Overall, the results of Study 4A and 4B provide converging evidence for Hypothesis 3 and thus our social contract account. When collective layoffs are due to offshoring, consumers evaluated a domestic firm more negatively than a foreign firm, but not when collective layoffs were due to declining product demand or automation.

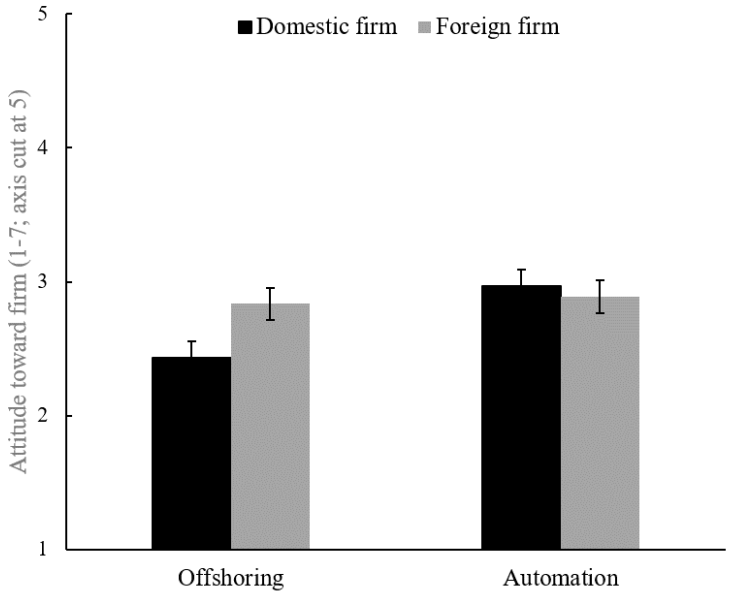

Figure 8. Interaction of firm country of origin and layoff reason in Study 4B (Essay 3).

General Discussion

An analysis of a large corpus of field data on European collective layoffs (*N* = 1,262) and four experimental studies (*N* = 1,772) provide evidence in line with our social contract account of responses to collective layoffs. Media reports and consumer responses were more negative when firms laid off workers due to offshoring than due to other reasons (Hypothesis

1). Across our studies, we tested this key prediction using different participant populations, stimuli, measures, designs, and—keeping the number of domestic job losses constant—four different baseline conditions: outsourcing, relocation, declining demand, and automation. We argued for a social contract account suggesting that overly negative consumer reactions of collective layoffs due to offshoring can be explained by a perceived breach of a social contract between the firm and the local community. Supporting this account, in Study 3 consumers rated a firm more negatively when the customer base was located in the home country than when it was located abroad (Hypothesis 2). Moreover, this difference was mediated by the extent to which the firm's decision was perceived as a social contract violation. In Studies 4A and 4B, we provide further evidence for our social contract account by looking at the moderating effect of the firm's country of origin (Hypothesis 3). We find that consumer reactions to offshoring decisions are more negative when the firm is domestic than when it is foreign, providing a counterintuitive reversal of the well-established home-country bias in international marketing research. Below, we discuss the theoretical and practical implications of the studies, as well as highlighting limitations and future research opportunities.

Theoretical and Managerial Implications

This study advances extant research in four important ways. First, we contribute to the literature on psychological reactions to offshoring (e.g., Grappi et al., 2013; Margalit, 2011; Owen, 2017). We theorize and empirically show that these reactions can be understood within a social contract account. A firm can lay off workers for different reasons, such as to decrease production (declining demand), rely on other workers in the same country (outsourcing or relocation), or rely on new technologies (automation). However, when a firm lays off workers and moves production to a foreign country, it violates a key element of the social contract: the normative expectation that firms support the local community. Our social contract account also allows us to explain *why* and predict *when* consumers do (not) react more negatively to

collective layoffs that result from offshoring compared to collective layoffs that result from other reasons. We show that the negative effect of offshoring decreases when most customers of a firm are foreign (vs. domestic), as in this case people perceive offshoring as a lesser social contract violation (Study 3). Moreover, the negative effect of offshoring is larger when the offshoring firm is domestic (vs. foreign; Studies 4A and 4B).

Second, we advance the social contract literature by shedding light on the formation and violation of implicit social contracts. In doing so, our research advances existing research in marketing (e.g., Malhotra, Sahadev, & Purani, 2017; Montgomery, Raju, Desai, & Unnava, 2018) which has mainly focused on how consumers react to instances where their psychological contracts with brands are violated (for example, when brands unexpectedly increase prices). Our research suggests that the country of origin of a firm and of a firm's customer base are important elements in the formation of social contracts, an understudied aspect in social contract theory (Thompson & Hart, 2006). Moreover, we show that social contract theory can serve as a fruitful framework to explain consumer reactions to offshoring.

Third, we contribute to the literature on home country bias (e.g., Sharma, 2011, 2015; Verlegh, 2007) by establishing a theoretically and managerially relevant boundary condition in which the well-documented bias reverses (see also Klein et al., 2006). Specifically, based on our social contract account, we document that a firm's strategic decision to offshore production can reverse consumers' generally positive attitudes towards domestic firms. Our findings thus suggest that home country biases might reverse when implicit social contracts between firms and domestic consumers are violated. Notably, we identify a novel boundary condition for the home country bias that is based on the behavior of firms, whereas existing research has mainly focused on boundary conditions based on consumer characteristics (e.g., a reduced bias for more value-conscious consumers; W. Wang, He, Sahadev, & Song, 2018), country factors (e.g., a reduced bias in developing countries; C. L. Wang & Chen, 2004), and product categories (e.g., a reduced bias for conspicuous products; C. L. Wang & Chen, 2004).

More broadly, our findings suggest that firms' strategic decisions can alleviate and reverse a positive home country bias.

Fourth, we contribute to the managerial discourse on the consequences of firms' collective layoff decisions. Prior research has thus far mainly focused on the general effect of collective layoffs on sales and marketing mix elasticities (Landsman & Stremersch, 2020) as well as on firm reputation (e.g., Love & Kraatz, 2009; Subramony & Holtom, 2012). Our research advances this stream of literature by shedding light on offshoring as one specific form of collective layoffs. Our findings that offshoring prompts distinct consumer reactions suggests that managers should view offshoring through a different lens than other forms of collective layoffs. Our research also suggests that managers should not only consider potentially positive supply-side effects of offshoring decisions on operational efficiency (e.g., Kotabe & Mudambi, 2009), but also consider potentially negative demand-side effects. Specifically, our findings suggest that firms should anticipate that the "stronger" the social contract between them and their surrounding community is, the more negatively offshoring decisions may affect their reputation, particularly among domestic customers. As collective layoff decisions are often featured in the media (see Study 1), consumers get informed and might react in potentially damaging ways (e.g., by boycotting buying the firm's products).

Limitations and Suggestions for Future Research

Our research has several limitations which might offer avenues for future research. First, the field data in Study 1 cover a large range of real-life layoff decisions and their media coverage in different European countries. Nevertheless, we acknowledge that the study relies on correlational data and offers only an indirect test of consumer reactions. In all other studies, we tested the effect of offshoring on consumer reactions in terms of attitudes towards the firm, an important predictor of crucial customer behaviors such as purchase intentions (e.g., Fazio & Petty, 2008) but also consumer boycotts (Garrett, 1987; Klein et al., 2004; Sen,

Gürhan-Canli, & Morwitz, 2001). Future studies could directly test whether consumer reactions to offshoring affect such downstream consequences in terms of behavioral intentions or real consumer behavior.

Second, we compared reactions to offshoring to other common types of layoffs including externally induced reasons (declining demand and automation) and practices in which jobs stay in the same country (relocation and outsourcing). Each of these other common layoff types have idiosyncratic characteristics and there is no "natural" control condition for offshoring; yet, comparisons of these other forms of layoffs with offshoring revealed consistent and similar patterns of results. Moreover, in Study 4A and 4B, we compared offshoring by a domestic versus foreign firm, which allowed for an internally valid test of our social contract account. Supporting our theorizing, consumers evaluated a domestic firm more negatively than a foreign firm only when collective layoffs were due to offshoring, but not when collective layoffs were due to other reasons. Moreover, our studies tested the effect of offshoring on firm attitudes in different countries (i.e., the UK and the US) and the results were consistent. It is possible, however, that socioeconomic and cultural differences across countries might affect how consumers perceive social contracts and their formation. Future research should therefore investigate whether these effects can also be observed in culturally different or less developed societies in which the meaning and formation of social contracts might be different.

Third, we did not examine how specific characteristics of the country to which a firm offshores its production affects consumer reactions. Instead, similar to the approach described above for the control condition used to judge the effect of offshoring, we attempted to triangulate the findings using different operationalizations. In Study 1, we have a large number of layoff decisions and control for a wide variety of countries. In the other studies, we kept the country unknown to participants. It is conceivable, however, that consumers perceive the social contract violation as stronger (or weaker) depending on specific characteristics of

the country to which production is offshored. Moreover, future research could investigate how perceptions of collective layoff decisions depend on consumers' sense of community. For example, German consumers might have more negative attitudes towards a firm that moves production from Germany to the Netherlands when they feel a sense of community at the country level (i.e., Germany) than when they feel a sense of community at the supranational level (i.e., the European Union).

Fourth, our social contract account points to the possibility that moving jobs within a country could sometimes also trigger similar negative effects as moving jobs abroad. For example, in countries with relatively weak internal cohesion, moving production to a different part of the country might be more likely to be perceived as a violation of the social contract (e.g., a Flemish company moving production to Wallonia, the French-speaking part of Belgium, or a Northern Italian company moving production to Southern Italy). Future research should explore when moving jobs within a country is perceived as a social contract violation.

Overall, this research sheds new light on how consumers, and more broadly the public, react towards firms that move their production abroad—and provides a conceptual framework to better understand these negative and often emotional reactions. We hope that our work inspires new research on the benefits and perils of offshoring.

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CHAPTER 5: CONCLUSION

The findings of this dissertation offer three main conclusions. First, the technological (vs. human) replacement of human labor has unique psychological consequences, which can be understood within a social comparison framework (Essay 1). Given the scant literature on the psychology of workplace automation (Waytz & Norton, 2014), and the crucial societal importance of this phenomenon, this research represents an important step towards a better understanding of how workers react to being replaced by modern machines, robots, or software (vs. other humans). Second, consumers prefer human (vs. robotic) labor more in more (vs. less) symbolic consumption contexts, and this preference can be understood within a framework that focuses on consumers' uniqueness motives. (Essay 2). Given that technological progress is fundamentally transforming how goods and services are produced, this research provides important insights into the demand-side perspective of human labor (i.e., for which products human labor creates more value for consumers than robotic labor). Third, people react more negatively when collective layoffs are due to offshoring than when collective layoffs are due to other reasons (e.g., outsourcing, automation), even if the number of domestic job losses is kept constant, and these negative reactions can be understood within a framework of social contracts (Essay 3). Given the importance of firms' offshoring decisions for consumers, workers, and society at large, this research helps to explain how and why moving domestic work abroad is psychologically different from other reasons for collective layoffs.

The findings of this dissertation also offer several practical contributions. For example, Essay 1 informs decision makers how to appropriately tailor job loss interventions for workers that attribute their job loss to technological replacement. Such programs can help to reemploy job seekers and reduce negative effects on their mental and physical health (McKee-Ryan, Song, Wanberg, & Kinicki, 2005); however, appropriately tailoring these interventions has

proven difficult in practice (Wanberg, 2012). Our work demonstrates that robotic (vs. human) replacement is less strongly associated with self-threat but more strongly associated with future economic concerns. Therefore, job loss interventions targeted at restoring feelings of competence and self-worth, which represent essential coping resources in the event of a job loss (McKee-Ryan et al., 2005), should be less of a priority when workers attribute their job loss to automation as opposed to human replacement. In contrast, for those workers who attribute their job loss to automation it would be better to devote all resources to interventions targeted at upgrading skills and retraining. Essay 2 informs firms about consumer acceptance of human versus robotic labor. We find that consumers prefer human (vs. robotic) labor more for products, services, or product features with higher symbolic value (e.g., when expressing something about one's beliefs and personality is of greater importance). Firms should therefore be aware that human involvement in the production process can create distinct value for potential customers when a product is intended to serve primarily symbolic purchasing goals, and market it accordingly. And Essay 3 informs firms about consumer reactions to offshoring. We find that consumers react more negatively when collective layoffs are due to offshoring than when they are due to other reasons (e.g., outsourcing, relocation, declining demand, and automation). Firms should therefore not only focus on potentially positive supply-side effects of offshoring decisions on operational efficiency (e.g., Kotabe and Mudambi 2009), but also consider potentially negative demand-side effects.

Beyond its practical contributions, this dissertation also points to important avenues for future research. For example, Essay 1 focuses on how people react when modern technology replaces jobs. Future research should therefore investigate how people react (and adapt) when modern technology replaces not entire jobs but specific tasks (e.g., by exploring how engaging workers in the decision to automate specific tasks affects their attitude towards modern technology). Essay 2 focuses on that consumers value human (vs. robotic) labor for symbolic products because they should associate human labor more strongly with product

uniqueness than robotic labor. This higher perceived uniqueness might stem jointly from the perceived uniqueness of the output of human labor and from the perceived sameness of the output of robotic labor. Future research should therefore investigate whether the tendency for consumers to prefer human versus robotic labor might reverse in contexts where the perceived sameness of robotic labor is valued (e.g., when precision and reliability are especially important). And Essay 3 suggests that the negative effect of offshoring depends on whether firms violate a key element of the social contract: the normative expectation that firms support the local community. Future research should therefore investigate how the negative effect of offshoring depends on the consumers' sense of community. For example, it might be conceivable that German consumers might have more negative attitudes towards a firm that moves production from Germany to the Netherlands when they feel a sense of community at the country level (i.e., Germany) than when they feel a sense of community at the supranational level (i.e., the European Union).

Taken together, this dissertation represents a significant step towards a better understanding of how people (e.g., workers or consumers) react to the technological replacement of human labor and to collective layoffs due to offshoring, two important and heatedly debated phenomena in today's society. The findings of this dissertation should be taken into account by policy measures (e.g., appropriately tailoring support programmes for workers affected by automation), by firms (e.g., considering demand-side consequences of offshoring), and by future researchers (e.g., understanding when consumers prefer robotic over human labor). However, while this dissertation aimed to set first foundations, I also hope it encourages more research on the psychology of automation and offshoring. This seems to be particularly important in times when a significant part of the public in Western societies perceives modern technology and globalization as a threat to their economic situation—and when populist movements are on the rise.

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APPENDIX A

All participants provided informed consent before participating. For each study, all materials presented to participants are displayed (e.g. preambles, vignettes, items) and ordered according to the sequence in which participants completed the study. The labels of all the variables we obtained in each study are put in square brackets.

Materials Study 1A

Screen 1:

Procedure

Please consider the following scenario and then answer the questions that follow. As we are interested in your earnest opinion, there are no right or wrong answers.

Screen 2 - Observer perspective condition:

Situation

A company needs to cut down the operating costs in one of its business units. To achieve this cost reduction goal, the company has two options available:

Option A:
The company can replace some of its existing employees by employees of an external supplier. Thus, in this case, **existing workers will be replaced by new employees.**

Option B:
The company can replace some of its existing employees by robots of an external supplier. Thus, in this case, **existing employees will be replaced by robots**.

The company´s initial pretests have shown that their cost reduction goals will be achieved in both scenarios while the quality of output will be maintained at the same level.

Screen 2 - Employee perspective condition:

Situation

Your company needs to cut down the operating costs in your business unit. To achieve this cost reduction goal, your company has two options available:

Option A:
Your company can replace some of its existing employees by employees of an external supplier. Thus, in this case, **you will be replaced by a new employee**.

Option B:

Your company can replace some of its existing employees by robots of an external supplier. Thus, in this case, **you will be replaced by a robot**.

The company´s initial pretests have shown that their cost reduction goals will be achieved in both scenarios while the quality of output will be maintained at the same level.

Screen 3 - Observer perspective condition:

Question

Please answer the following question

[Preferences human versus robotic replacement]
□ I would prefer that existing employees would be **replaced by new employees**
□ I would prefer that existing employees would be **replaced by robots**

Screen 3 - Employee perspective condition:

Question

Please answer the following question

[Preferences human versus robotic replacement]
□ I would prefer to be **replaced by a new employee**
□ I would prefer to be **replaced by a robot**

Screen 4:

Question

[Qualitative question]
Please elaborate on your choice. Can you elaborate on where you exactly perceive differences between the two options?
{Textbox}

Screen 5:

[Gender]
What is your gender?
□ Female
□ Male

[Age]
How old are you (in years)?
{Textbox}

[Education]
What is the highest level of education you have completed?

□ Less than high school
□ High School
□ Some college, no degree
□ Bachelor/Master`s degree
□ Doctoral degree
□ Other

[Occupation]
Which occupational category best describes your employment?
□ Legislators, senior officials and managers
□ Professionals or Technicians
□ Clerks
□ Service workers and shop and market sales workers
□ Skilled agricultural and fishery workers
□ Craft and related trades workers
□ Plant and machine operators and assemblers
□ Elementary occupations
□ Armed forced
□ Other

[Income]
What is your annual income range?
□ Below $20,000
□ $20,000 - $29,999
□ $30,000 - $39,999
□ $40,000 - $49,999
□ $50,000 or more

Screen 6:

[Attention check]
Just a short reading check. Can you remember:

Just according to the pretests of the company, in which scenario will the cost reduction goal be more likely achieved?

□ Replacement by other employees
□ There was no difference
□ Replacement by robots

Materials Study 1B

Screen 1:

Procedure

Please consider the following scenario and then answer the questions that follow. As we are interested in your earnest opinion, there are no right or wrong answers.

Screen 2 - Observer perspective condition:

Situation

A company needs to increase the efficiency of one of its business units. To achieve this goal, the company has two options available:

Option A:

The company can replace some of its existing employees by employees of an external supplier. Thus, in this case, **existing workers will be replaced by new employees**.

Option B:

The company can replace some of its existing employees by robots of an external supplier. Thus, in this case, **existing employees will be replaced by robots**.

The company´s initial pretests have shown that their cost reduction goals will be achieved in both scenarios while the quality of output will be maintained at the same level.

Screen 2 - Employee perspective condition:

Situation

Your company needs to increase the efficiency of one of its business units. To achieve this cost reduction goal, your company has two options available:

Option A:
Your company can replace some of its existing employees by employees of an external supplier. Thus, in this case, **you will be replaced by a new employee.**

Option B:
Your company can replace some of its existing employees by robots of an external supplier. Thus, in this case, **you will be replaced by a robot.**

The company´s initial pretests have shown that their cost reduction goals will be achieved in both scenarios while the quality of output will be maintained at the same level.

Screen 3 - Observer perspective condition:

Please elaborate on the following questions:

[Elaboration human replacement]
Now, consider that this company **replaces some of its existing employees by other employees**. Thus, their jobs are now done **by other workers**. How would you personally feel about this?
{Textbox}

[Elaboration robotic replacement]
Now, consider that this company **replaces some of its existing employees by robots**. Thus, their jobs are now done **by machines**. How would you personally feel about this?

{Textbox}

Screen 3 - Employee perspective condition:

[Elaboration human replacement]
Now, consider that you work for this company and **you will be replaced by another employee**. Thus, your job is now done **by another worker.** How would you feel about this as an employee?
{Textbox}

[Elaboration robotic replacement]
Now, consider that you work for this company and **you will be replaced by a robot**. Thus, your former job is now done **by a machine**. How would you feel about this as an employee?
{Textbox}

Screen 4 - Observer perspective condition:

Question

Now please imagine that some of the existing employees lose their jobs and will be replaced. Which option would you prefer?

[Preferences human versus robotic replacement]
□ I would rather prefer that existing employees would be **replaced by new employees**
□ I would rather prefer that existing employees would be **replaced by robots**

Screen 4 - Employee perspective condition:

Question

Now please imagine that you lose your job and will be replaced. Which option would you prefer?

[Preferences human versus robotic replacement]
□ I would rather prefer to be **replaced by a new employee**
□ I would rather prefer to be **replaced by a robot**

Screen 5:

[Attention check]
Just a short reading check. Can you remember:

Just according to the pretests of the company, in which scenario will the cost reduction goal be more likely achieved?

□ Replacement by other employees
□ There was no difference
□ Replacement by robots

Screen 6:

[Gender]
What is your gender?
□ Female
□ Male

[Age]
How old are you (in years)?
{Textbox}

[Education]
What is the highest level of education you have completed?
□ Less than high school
□ High School
□ Some college, no degree
□ Bachelor/Master`s degree
□ Doctoral degree
□ Other

[Income]
What is your annual income range?
□ Below $20,000
□ $20,000 - $29,999
□ $30,000 - $39,999
□ $40,000 - $49,999
□ $50,000 or more

[Occupation]
Which category best describes your current job occupation?
□ Farmer or fisherman
□ Professional (lawyer, medical practitioner, accountant, architect, etc.)
□ Owner of a shop, craftsmen, other self-employed person
□ Business proprietors, owner (full or partner) of a company
□ General management, director or top management (managing directors, director general, other director)
□ Middle management, other management (department head, junior manager, teacher, technician)
□ Employed position, working mainly at a desk
□ Employed position, not at a desk but travelling (salesmen, driver, etc.)
□ Employed position, not at a desk, but in a service job (hospital, restaurant, police, fireman, etc.)
□ Supervisor
□ Skilled manual worker
□ Other (unskilled) manual worker
□ Currently not employed full-time or part-time

Materials Study 1C

Screen 1 - Observer perspective condition:

Situation

Please consider that employees are working for a large manufacturing company. They have the feeling that they do a good job.

Screen 1 - Employee perspective condition:

Please consider that you are working for a large manufacturing company. You have the feeling that you do a good job.

Screen 2 - Observer perspective condition:

Situation

Now, this company has decided to reorganize its business processes.

As part of this reorganization process, some of the existing employees will be replaced and therefore lose their job. In order to replace the employees and achieve the goal of the reorganization process, the company has two options available:

Option A:

Some of the existing employees will be replaced by **modern robots**. So, in this case their job will be performed by robots which **automatically** do the tasks they did.

Option B:

Some of the existing employees will be replaced by **other employees**. So, in this case their job will be performed by other employees who do the tasks they did.

Question

Now, we are interested in your thoughts and feelings regarding existing employees being replaced

[Preferences human versus robotic replacement]
I would prefer existing employees to be replaced

by other employees □ □ by modern robots

Screen 2 - Employee perspective condition:

Situation

Now, your company has decided to reorganize its business processes.

As part of this reorganization process, you will be replaced and therefore you lose your job. In order to replace you and achieve the goal of the reorganization process, your company has two options available:

Option A:
You will be replaced by **a modern robot**. So, in this case your job will be performed by a robot which **automatically** does the tasks you did.

Option B:
You will be replaced by **another employee**. So, in this case your job will be performed by a another employee who does the tasks you did.

Question

Now, we are interested in your thoughts and feelings regarding you being replaced

[Preferences human versus robotic replacement]
I would prefer to be replaced

by another employee □ □ by a modern robot

Screen 3:

[Gender]
What is your gender?
□ Male
□ Female

[Age]
How old are you?
{Textbox}

Materials Study 2

Screen 1:

[Gender]
What is your gender?
□ Female
□ Male

[Age]
How old are you (in years)?
{Textbox}

[Income]
What is your household´s yearly income before taxes?

□ Less than $25,000
□ $25,000 to $50,000
□ $50,001 to $75,000
□ $75,001 to $100,000
□ $100,000 or more

Screen 2 - Observer perspective condition:

Situation

Please consider that employees are working for a large company. They have the feeling that they do a good job.

Screen 2 - Employee perspective condition:

Please consider that you are working for a large company. You have the feeling that you do a good job.

Screen 3 - Observer perspective condition:

Situation

Now, this company has decided to reorganize its business processes.

As part of this reorganization process, some of the existing employees will be replaced and therefore lose their job. In order to replace the employees and achieve the goal of the reorganization process, the company has two options available:

Option A:

Some of the existing employees will be replaced by **modern robots**. So, in this case their job will be performed by robots which **automatically** do the tasks they did.

Option B:

Some of the existing employees will be replaced by **other employees**. So, in this case their job will be performed by other employees who do the tasks they did

Questions

Now, we are interested in your feelings regarding existing employees being replaced

	…by other	…by modern robots

	employees						
[Emotional reactions: item 1] I would feel more sad if existing employees were replaced...	□	□	□	□	□	□	□
[Emotional reactions: item 2] I would feel more angry if existing employees were replaced...	□	□	□	□	□	□	□
[Emotional reactions: item 3] I would feel more frustrated if existing employees were replaced...	□	□	□	□	□	□	□

Screen 3 - Employee perspective condition:

Situation

Now, your company has decided to reorganize its business processes.

As part of this reorganization process, you will be replaced and therefore you lose your job. In order to replace you and achieve the goal of the reorganization process, your company has two options available:

Option A:

You will be replaced by **a modern robot**. So, in this case your job will be performed by a robot which **automatically** does the tasks you did.

Option B:

You will be replaced by **another employee**. So, in this case your job will be performed by a another employee who does the tasks you did.

Questions

Now, we are interested in your feelings regarding you being replaced

	…by another employee						…by a modern robot
[Emotional reactions: item 1] I would feel more sad if I was replaced...	□	□	□	□	□	□	□
[Emotional reactions: item 2] I would feel more angry if I was replaced...	□	□	□	□	□	□	□
[Emotional reactions: item 3] I would feel more frustrated if I was replaced...	□	□	□	□	□	□	□

Screen 4:

[Qualitative question]
Please elaborate on your choice. Can you elaborate on where you exactly perceive differences between the two options?
{Textbox}

Materials Study 3A

Screen 1:

Procedure

Please consider the following scenario and then answer the questions that follow. As we are interested in your honest opinion, there are no right or wrong answers.

Screen 2:

Situation

Consider that you have just recently graduated from law school and now you work at a reputable law firm.

Your job is to assist senior attorneys on their cases. For example, you do research on previous court decisions and existing laws, you analyze and review various electronically stored data like legal documents, textbooks, and case reports, and you prepare summaries on legal issues.

You have the feeling that you do a good job.

Screen 3:

Situation

After doing your job for one year, your company has decided to reorganize its business processes.

Now, your company has informed you that as a part of this reorganization process, you will be replaced and therefore you lose your job. In order to replace you and achieve the goal of the reorganization process, the company has two options available:

Option A:

You will be replaced by a **modern software algorithm**. So, in this case your job will be performed by an algorithm that does **automatically** the data analyses and reviews you did and helps to support an attorney

Option B:

You will be replaced by **another recent graduate from law school**. So, in this case your job will be performed by another lawyer that does the data analyses and reviews you did and helps to support an attorney.

Your company is confident that the reorganization process will be a success with both options, while the quality of output will be maintained at the same level.

Screen 4:

Questions

[Preferences human versus robotic replacement]
I would prefer being replaced

by another lawyer □ □ □ □ □ □ by a software

[Self-threat: item 1]
Which option would make you feel more devalued?

Being replaced by another lawyer □ □ □ □ □ □ Being replaced by a software

[Self-threat: item 2]
Which option would make you raise more doubts about yourself?

Being replaced by another lawyer □ □ □ □ □ □ Being replaced by a software

[Self-threat: item 3]
Which option would make you question more your own abilities?

Being replaced by another lawyer □ □ □ □ □ □ Being replaced by a software

Screen 5:

We would also like to understand how you would feel about your future depending on whether you were replaced by a modern software or by another lawyer

[Future economic concerns: item 1]
Which option would make you feel more worried about the future?

Being replaced by another lawyer □ □ □ □ □ □ Being replaced by a software

[Future economic concerns: item 2]
Which option would make it more difficult for you to find another job?

Being replaced by another lawyer □ □ □ □ □ □ Being replaced by a software

[Future economic concerns: item 3]
Which option would make it more stressful for you to find another job?

Being replaced by another lawyer □ □ □ □ □ □ Being replaced by a software

Screen 6:

[Qualitative question]
Can you elaborate on why you preferred being replaced by one option over the other? Can you describe where you perceive and feel differences between the two options?
{Textbox}

Screen 7:

[Gender]
What is your gender?
□ Female
□ Male

[Age]
How old are you (in years)?
{Textbox}

[Education]
What is the highest level of education you have completed?
□ Less than high school
□ High School
□ Some college, no degree
□ Bachelor/Master`s degree
□ Doctoral degree
□ Other

Materials Study 3B

Screen 1:

[Screen-out question]
Are you currently working in the manufacturing industry?
□ Yes
□ No

Screen 2:

[Current job manufacturing industry]
Please name your current job in the manufacturing industry
[Textbox]

Screen 3:

Situation

Now, please imagine that your company has decided to reorganize its business processes.

As part of this reorganization process, you will be replaced and therefore you lose your job. In order to replace you and achieve the goal of the reorganization process, your company has two options available:

Option A:

You will be replaced by **new technology**. So, in this case your job will be performed by new technology which **automatically** does the tasks you did.

Option B:

You will be replaced by **a new manufacturing worker**. So, in this case your job will be performed by a new manufacturing worker who does the tasks you did.

Questions

Now, we are interested in your thoughts and feelings regarding you being replaced

[Preferences human versus robotic replacement]
I would prefer being replaced

by a new manufacturing worker	□	□	□	□	□	□	by new technology

[Self-threat: item 1]
Which option would make you feel more devalued?

Being replaced by a new manufacturing worker	□	□	□	□	□	□	Being replaced by new technology

[Self-threat: item 2]
Which option would make you raise more doubts about yourself?

Being replaced by a new manufacturing worker	□	□	□	□	□	□	Being replaced by new technology

[Self-threat: item 3]
Which option would make you question more your own abilities?

Being replaced by a new manufacturing worker	□	□	□	□	□	□	Being replaced by new technology

Screen 4:

We would also like to understand how you would feel about your future depending on whether you were replaced by new technology or by a new manufacturing worker

[Future economic concerns: item 1]
Which option would make you feel more worried about the future?

Being replaced by a new manufacturing worker	□	□	□	□	□	□	Being replaced by new technology

[Future economic concerns: item 2]
Which option would make it more difficult for you to find another job?

Being replaced by a new manufacturing worker	□	□	□	□	□	□	Being replaced by new technology

[Future economic concerns: item 3]
Which option would make it more stressful for you to find another job?

Being replaced by a new manufacturing worker	□	□	□	□	□	□	Being replaced by new technology

Screen 5:

[Believability]
Do you think that it is believable that your current job can be replaced by new technology at some point in the (near) future?
□ Yes
□ No

Screen 6:

[Current occupation manufacturing industry]
Which category best describes your current job?
□ Assembler or fabricator
□ Supervisor of production and operating workers
□ Machinist/Operator
□ Food processing
□ Metal or plastic machine worker
□ Painting or coating worker
□ Power plant operator
□ Quality control
□ Welder or cutter
□ Woodworker
□ Other

Screen 7:

[Gender]
What is your gender
□ Female
□ Male

[Age]
Q27. How old are you in years?
[*Textbox*]

[Education]
What is the highest level of school you have completed or the highest degree you have received?
□ No formal qualifications
□ Secondary school
□ College
□ Undergraduate degree (BA/BSc/other)
□ Graduate degree (MA/MSc/MPhil/other)

[Income]
What is your current income range?
□ Below 20.000€ □ 20.000€- 29.999€ □ 30.000€– 39.999€ □ 40.000€– 49.999€ □ 50.000€– 59.999€ □ 60.000€ or more

Note: The nationality of the participants was provided by Prolific.

Materials Study 4

Screen 1:

Procedure

Please consider the following scenario and then answer the questions that follow. As we are interested in your honest opinion, there are no right or wrong answers.

Screen 2:

Situation

Consider that you have just recently graduated from high school and you started to work as a warehouse worker at a large logistics firm.

Your job is to prepare and complete warehouse stock orders for delivery according to schedule. For example, you move and distribute packages to their delivery area by using a trolley and you store new incoming packages.

You have the feeling that you do a good job.

Screen 3 - Robotic replacement condition:

Situation

After doing your job for one year, your company has decided to reorganize its business processes. Now, your company has informed you that you will lose your job. The reason for that is that in order to achieve the goals of the reorganization process, **you will be replaced by a modern robot**.

So, in the future your job will be performed **by a robot** that does the tasks you did and moves, distributes and stores the packages **automatically**.

Please answer the following questions

If I were replaced by a modern robot, then:

[Self-threat: item 1]

I would question my abilities	□	□	□	□	□	□	I would not question my abilities at all

[Self-threat: item 2]

It would raise doubts about myself	□	□	□	□	□	□	It would not raise any doubts about myself

Screen 3 - Human replacement condition:

Situation

After doing your job for one year, your company has decided to reorganize its business processes. Now, your company has informed you that you will lose your job. The reason for that is that in order to achieve the goals of the reorganization process, **you will be replaced by another warehouse worker**.

So, in the future your job will be performed **by another warehouse worker** that does the tasks you did and moves, distributes and stores the packages.

Please answer the following questions

If I were replaced by another warehouse worker, then:

[Self-threat: item 1]

I would question my abilities □ □ □ □ □ □ I would not question my abilities at all

[Self-threat: item 2]

It would raise doubts about myself □ □ □ □ □ □ It would not raise any doubts about myself

Screen 4 - Robotic replacement condition:

Please answer the following questions

We would also like to understand **how you would feel about your future** if you lost your job because you were replaced **by a modern robot** and thus your job became **automated**

[Future economic concerns: item 1]

How worried would you be about your future?

Not at all □ □ □ □ □ □ Extremely

[Future economic concerns: item 2]

How difficult do you think it would be for you to find another job?

Not at all □ □ □ □ □ □ Extremely

Screen 4 - Human replacement condition:

Please answer the following questions

We would also like to understand **how you would feel about your future** if you lost your job because you were replaced **by another warehouse worker**

[Future economic concerns: item 1]

How worried would you be about your future?

Not at all □ □ □ □ □ □ Extremely

[Future economic concerns: item 2]
How difficult do you think it would be for you to find another job?

Not at all □ □ □ □ □ □ Extremely

Screen 5 - Robotic replacement condition:

[Qualitative question]
Can you elaborate on how you would feel about your future as a worker if you were replaced by a modern robot?
{Textbox}

Screen 5 - Human replacement condition:

[Qualitative question]
Can you elaborate on how you would feel about your future as a worker if you were replaced by another warehouse worker?
{Textbox}

Screen 6:

[Gender]
What is your gender?
□ Female
□ Male

[Age]
How old are you (in years)?
{Textbox}

[Education]
What is the highest level of education you have completed?
□ Less than high school
□ High School
□ Some college, no degree
□ Bachelor/Master`s degree
□ Doctoral degree
□ Other

Screen 7:

[Attention check]
Just a short reading check. Can you remember:

For which kind of job have you been replaced?
□ I was replaced as a warehouse worker □ I was replaced as accountant

Materials Study 5A

Screen 1:

Procedure

Please consider the following scenario and then answer the questions that follow. We are interested in your honest opinion, there are no right or wrong answers.

Screen 2:

Situation

Please imagine that you have recently successfully graduated from business school and that you now work as a junior market analyst at a reputable firm.

Your job is to help grasp consumer behavior trends and conduct market research. For example, you identify and define target audiences, and assist in analyzing market data and campaign results.

You have the feeling that you do a good job.

Screen 3:

Situation

After doing your job for one year, your company has decided to reorganize its business processes.

Now, your company has informed you that, as a part of this reorganization process, you will be replaced and therefore you lose your job. In order to replace you and achieve the goal of the reorganization process, the company has two options available:

Option A:

You will be replaced by a **modern software algorithm**. So, in this case your job will be performed by a software, which **automatically** does the tasks you did, for example, analyzing market data and campaign results.

Option B:

You will be replaced by **another recent college graduate**. So, in this case your job will be performed by another market analyst who does the tasks you did, for example, analyzing market data and campaign results.

Screen 4:

Now, we are interested in your thoughts and feelings regarding you being replaced.

Questions

[Preferences human versus robotic replacement]

I would prefer being replaced

by another person □ □ □ □ □ □ by a software

[Self-threat: item 1]
Which option would make you feel more devalued?

Being replaced by another person □ □ □ □ □ □ Being replaced by a software

[Self-threat: item 2]
Which option would make you raise more doubts about yourself?

Being replaced by another person □ □ □ □ □ □ Being replaced by a software

[Self-threat: item 3]
Which option would make you question more your own abilities?

Being replaced by another person □ □ □ □ □ □ Being replaced by a software

Screen 5:

Now, we would like to understand better how you felt regarding being either replaced by another person or by a modern software

Questions

[Engagement in social comparisons: item 1]
It was easier to compare myself with

the other person □ □ □ □ □ □ the modern software

[Engagement in social comparisons: item 2]
I compared myself more strongly with

the other person □ □ □ □ □ □ the modern software

[Engagement in social comparisons: item 3]
It was more natural to me to compare myself with

the other person □ □ □ □ □ □ the modern software

[Engagement in social comparisons: item 4]
To me, it was more relevant to compare my abilities with

the other person □ □ □ □ □ □ the modern software

Screen 6:

[Believability]

Do you think the scenario you read in which a junior market analyst is replaced by modern software is a believable scenario?
□ Yes
□ No

Screen 7:

[Gender]
What is your gender?
□ Male
□ Female

[Age]
How old are you (in years)?
{Textbox}

Materials Study 5B

Screen 1:

Situation

Consider that you work as a warehouse worker at a large logistics firm.

Your job is to prepare and complete warehouse stock orders for delivery according to schedule. For example, you move and distribute packages to their delivery area by using a trolley and you store new incoming packages.

You have the feeling that you do a good job.

Screen 2 - Robotic replacement condition:

Situation

After doing your job for one year, your company has decided to reorganize its business processes. Now, your company has informed you that you will lose your job. The reason for that is that in order to achieve the goals of the reorganization process, **you will be replaced by a modern robot**.

So, in the future your job will be performed **by a robot** that does the tasks you did and moves, distributes and stores the packages **automatically**.

Questions

Now, we are interested in your thoughts and feelings regarding you being replaced by a modern robot

If I were replaced by a modern robot, then:

Self-threat: item 1]

It would make me feel devalued	□	□	□	□	□	□	It would not make me feel devalued at all

[Self-threat: item 2]

It would raise doubts about myself	□	□	□	□	□	□	It would not raise any doubts about myself

[Self-threat: item 3]

I would question my abilities	□	□	□	□	□	□	I would not question my abilities at all

Screen 3 - Human replacement condition:

Situation

After doing your job for one year, your company has decided to reorganize its business processes. Now, your company has informed you that you will lose your job. The reason for that is that in order to achieve the goals of the reorganization process, **you will be replaced by another warehouse worker**.

So, in the future your job will be performed **by another warehouse worker** that does the tasks you did and moves, distributes and stores the packages.

Questions

Now, we are interested in your thoughts and feelings regarding you being replaced by another warehouse worker

If I were replaced by another warehouse worker, then:

Self-threat: item 1]

It would make me feel devalued	□	□	□	□	□	□	It would not make me feel devalued at all

[Self-threat: item 2]

It would raise doubts about myself	□	□	□	□	□	□	It would not raise any doubts about myself

[Self-threat: item 3]

I would question my abilities	□	□	□	□	□	□	I would not question my abilities at all

Screen 4 - Robotic replacement condition:

Now, we would like to understand better how you felt regarding being replaced by a modern robot

[Engagement in social comparisons: item 1]
It was easy to compare myself with the modern robot replacing me

Not at all □ □ □ □ □ □ Very much

[Engagement in social comparisons: item 2]
I compared myself strongly with the modern robot replacing me

Not at all □ □ □ □ □ □ Very much

[Engagement in social comparisons: item 3]
It was natural to me to compare myself with the modern robot replacing me

Not at all □ □ □ □ □ □ Very much

[Engagement in social comparisons: item 4]
It was relevant to me to compare my abilities with those of the modern robot replacing me

Not at all □ □ □ □ □ □ Very much

Screen 4 - Human replacement condition:

Now, we would like to understand better how you felt regarding being replaced by another warehouse worker

[Engagement in social comparisons: item 1]
It was easy to compare myself with the other warehouse worker replacing me

Not at all □ □ □ □ □ □ Very much

[Engagement in social comparisons: item 2]
I compared myself strongly with the other warehouse worker replacing me

Not at all □ □ □ □ □ □ Very much

[Engagement in social comparisons: item 3]
It was natural to me to compare myself with the other warehouse worker replacing me

Not at all □ □ □ □ □ □ Very much

[Engagement in social comparisons: item 4]
It was relevant to me to compare my abilities with those of the other warehouse worker replacing me

Not at all □ □ □ □ □ □ Very much

Screen 5 - Robotic replacement condition:

[Believability]
Do you think the scenario you read in which a warehouse worker is replaced by a modern robot is a believable scenario?
□ Yes
□ No

Screen 5 - Human replacement condition:

[Believability]
Do you think the scenario you read in which a warehouse worker is replaced by another warehouse worker is a believable scenario?
□ Yes
□ No

Screen 6:

[Attention check]
Just a short reading check. Can you remember:

For which kind of job have you been replaced?
□ I was replaced as a warehouse worker □ I was replaced as accountant

Screen 7:

[Study purpose]
Can you please briefly describe your idea what this survey was about?
{Textbox}

Screen 8:

[Gender]
What is your gender?
□ Male
□ Female

[Age]
How old are you?
{Textbox}

[Education]
What is the highest level of education you have completed?
□ Less than high school
□ High School
□ Some college, no degree
□ Bachelor/Master`s degree
□ Doctoral degree

[Income]

Please indicate your household income (previous year) before taxes.
□ Below 20.000$ □ 20.000$ - 29.999$ □ 30.000$ – 39.999$ □ 40.000$ – 49.999$
□ 50.000$ –59.999$ □ 60.000$ or more

Materials Study 5C

Screen 1:

[Attention check 1]
Please write **Mturk123$** in the textbox below.
{Textbox}

[In case participants failed the attention check above, they were asked to perform another attention Check]

[Attention check 2]

We are sorry, but you might have missed something.
Attention: if you miss this attention check again, we need to exclude you from taking this HIT.
Please read the instructions below again and type in the appropriate text in the textbox below (only the part that is written in bold!).

Please write **Mturk123$Mnu** in the textbox below.
{Textbox}

Screen 2:

Situation

Imagine you have studied languages at college and you recently started to work as a professional translator for a large international company.

Your job is to translate technical product features from English into other languages.

Screen 3 - Robotic replacement condition:

Situation

Now, your company has informed you that as part of a reorganization process, you will lose your job **and will be replaced by a modern software relying on artificial intelligence**.

So, your job of will be performed **by software that uses artificial intelligence**.

Questions

*Now, we are interested in your thoughts and feelings regarding you, a professional translator, being replaced **by the new software that makes use of artificial intelligence.***

If I were replaced by the software that uses artificial intelligence, then:

[Self-threat: item 1]							
It would raise doubts about myself	□	□	□	□	□	□	It would not raise any doubts about myself
[Self-threat: item 2]							
I would question my abilities	□	□	□	□	□	□	I would not question my abilities at all
Self-threat: item 3]							
It would make me feel devalued	□	□	□	□	□	□	It would not make me feel devalued at all

Screen 3 - Human replacement condition:

Situation

Now, your company has informed you that, as a part of a reorganization process, you will lose your job **and will be replaced by another employee who will do the translation.**

So, your job of will be performed **by another employee**.

Questions

*Now, we are interested in your thoughts and feelings regarding you, a professional translator, being replaced **by the new employee.***

If I were replaced by the employee, then:

[Self-threat: item 1]							
It would raise doubts about myself	□	□	□	□	□	□	It would not raise any doubts about myself
[Self-threat: item 2]							
I would question my abilities	□	□	□	□	□	□	I would not question my abilities at all
Self-threat: item 3]							
It would make me feel devalued	□	□	□	□	□	□	It would not make me feel devalued at all

Screen 3 - Human replacement complemented by technology condition:

Situation

Now, your company has informed you that as part of a reorganization process, you will lose your job **and will be replaced by another employee who will do the translations relying on artificial**

intelligence.

So, your job will be performed **by another employee that uses artificial intelligence**.

Questions

*Now, we are interested in your thoughts and feelings regarding you, a professional translator, being replaced **by the new employee that makes use of artificial intelligence.***

If I were replaced by the employee that uses artificial intelligence, then:

[Self-threat: item 1] It would raise doubts about myself	□	□	□	□	□	□	It would not raise any doubts about myself
[Self-threat: item 2] I would question my abilities	□	□	□	□	□	□	I would not question my abilities at all
Self-threat: item 3] It would make me feel devalued	□	□	□	□	□	□	It would not make me feel devalued at all

Screen 4 - Robotic replacement condition:

Now, we are interested to what extent did you, as a professional translator, compare yourself with the software that uses artificial intelligence?

	Strongly agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree
[Relevance comparison target: item 1] As a translator, I felt it makes sense to compare myself with the software	□	□	□	□	□	□	□
[Relevance comparison target: item 2] I compared myself with the software that replaced me as a professional translator.	□	□	□	□	□	□	□
[Relevance comparison target: item 3] It felt reasonable to compare myself with the software that uses artificial intelligence.	□	□	□	□	□	□	□

[Relevance comparison target: item 4] As a translator, I felt somewhat similar to the software that replaced me.	□	□	□	□	□	□	□

Screen 4 - Human replacement condition:

Now, we are interested to what extent did you, as a professional translator, compare yourself with the employee that does the translation?

	Strongly agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree
[Relevance comparison target: item 1] As a translator, I felt it makes sense to compare myself with the employee	□	□	□	□	□	□	□
[Relevance comparison target: item 2] I compared myself with the employee that replaced me as a professional translator.	□	□	□	□	□	□	□
[Relevance comparison target: item 3] It felt reasonable to compare myself with the employee	□	□	□	□	□	□	□
[Relevance comparison target: item 4] As a translator, I felt somewhat similar to the employee that replaced me.	□	□	□	□	□	□	□

Screen 4 - Human replacement complemented by technology condition:

Now, we are interested to what extent did you, as a professional translator, compare yourself with the employee that uses artificial intelligence?

	Strongly agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree

[Relevance comparison target: item 1] As a translator, I felt it makes sense to compare myself with the employee that makes use artificial intelligence .	□	□	□	□	□	□	□
[Relevance comparison target: item 2] I compared myself with the employee that replaced me as a professional translator.	□	□	□	□	□	□	□
[Relevance comparison target: item 3] It felt reasonable to compare myself with the employee that uses artificial intelligence.	□	□	□	□	□	□	□
[Relevance comparison target: item 4] As a translator, I felt somewhat similar to the employee that replaced me.	□	□	□	□	□	□	□

Screen 5:

[Gender]
What is your gender?
□ Male
□ Female

[Age]
How old are you?
{Textbox}

[Education]
What is the highest level of education you have completed?
□ Less than high school
□ High School
□ Some college, but no degree
□ Bachelor/Master`s degree
□ Doctoral degree

Materials Study 6

Screen 1:

Thank you a lot that you are willing to participate in this survey.

In this survey, we are interested in the opinions of people who have recently lost their job.

[Screen-out question]
Have you lost your job at least once within the last two years?
If you answer "Yes", you will proceed with this survey. If you answer "No", we offer you the possibility to participate in another survey.
□ Yes □ No

Screen 2:

We guarantee you that your information will be kept confidential, will be fully anonymized and will not be distributed.

We are interested in your honest opinion. So, there are no right or wrong answers.

Screen 3:

Questions

Now, please think of (the most recent) job that you have lost in the last two years.

[Qualitative description former job]
Can you please briefly describe this last job? Which kind of tasks were you doing?
[*Textbox*]

[Qualitative description industry former job]
Can you please briefly describe in which kind of industry/sector you were working in this last job?
[Textbox]

Screen 4:

Questions

To what extent do you think the following reasons played a role why you lost your job?
You can move the round blue cursor with you mouse

[Attribution of job loss to robotic replacement]
My job became automated (my job is now done by machines, robots, a software, etc.)?

(A ten-point slider scale with "1" for "Played no role" and "10" for "Played a major role")

Played no role — Played a major role

□ □ □ □ □ □ □ □ □ □

***[Attribution of job loss to* human *replacement*]**
I was replaced by another worker (for example, my job is now done by people working in other firms, other countries, etc.)

(A ten-point slider scale with "1" for "Played no role" and "10" for "Played a major role")

Played no role — Played a major role

□ □ □ □ □ □ □ □ □ □

[Attribution of job loss to human replacement]
Other reasons

(A ten-point slider scale with "1" for "Played no role" and "10" for "Played a major role")

Played no role — Played a major role

□ □ □ □ □ □ □ □ □ □

[Qualitative description reasons job loss]

Could you please briefly describe the reasons why you lost you job?

[Textbox]

Screen 5:

Questions

Now, please think of the **reasons** why you lost your job. We are interested in **how these reasons made you feel**.

Due to the reasons why I lost my job,

[Job-loss related self-threat: Item 1]
I did question my abilities

Strongly disagree □ □ □ □ □ □ Strongly agree

[Job-loss related self-threat: Item 2]
It did make me feel extremely devalued

Strongly disagree □ □ □ □ □ □ Strongly agree

[Job-loss related self-threat: Item 3]
It did raise doubts about myself

Strongly disagree □ □ □ □ □ □ Strongly agree

Screen 6:

Questions

Now, please think of the **reasons** why you lost your job. We are interested in **how these reasons made you feel**.

[Job-loss related future economic concerns: Item 1]
How worried were you about your future (in terms of your job, profession)?

Not at all worried □ □ □ □ □ □ Extremely worried

[Job-loss related future economic concerns: Item 2]
How difficult did you think it would be to find another job?

Not at all difficult □ □ □ □ □ □ Extremely difficult

[Job-loss related future economic concerns: Item 3]
How stressful did you think it would be to find another job?

Not at all stressful □ □ □ □ □ □ Extremely stressful

Screen 7:

Questions

Considering the job that you lost, what do you think happened with this job?
You can move the round blue cursor with you mouse

[Workers´ beliefs that another worker is doing their job today]
I think the job that I lost is now done by another worker

(A ten-point slider scale with "1" for "No" and "10" for "Yes")

No Yes
□ □ □ □ □ □ □ □ □ □

[Workers´ beliefs that a machine is doing their job today]
I think the job that I lost is now done by a machine

(A ten-point slider scale with "1" for "No" and "10" for "Yes")

No Yes
□ □ □ □ □ □ □ □ □ □

[No knowledge what happened to their job today]
I do not know what happened to my job

(A ten-point slider scale with "1" for "No" and "10" for "Yes")

No Yes

□ □ □ □ □ □ □ □ □ □

[Qualitative description beliefs about the present status of the lost job]
Could you please briefly describe what you think happened with the job that you have lost?
[*Textbox*]

Screen 8:

Questions

In the industry in which you were working in when you lost your job, do you think that

[Industry-specific commonness of robotic replacement]
The automation of jobs (jobs usually performed by workers are increasingly done by machines, robots, a software, etc.) is a common phenomenon

Not at all common □ □ □ □ □ □ Extremely common

[Industry-specific commonness of human replacement]
Being replaced by another worker is a common phenomenon

Not at all common □ □ □ □ □ □ Extremely common

Screen 9:

[Time worked at former company]
How long did you work for the firm/company (where you lost your job).

□ Less than 12 months □ 1-4 years □ 5-9 years □ 10-19 years □ 20 years or more

[Numbers of employees at former company]
How many employees did the company have where you lost your job?

□ 1 – 10 □ 10 – 50 □ 50 – 100 □ 100 – 250 □ 250 – 500 □ 500 – 1000 □ 1000 – 2500 □ 2500 – 5000 □ 5000 – 10000 □ >10.000

[Former income]
What was your approximate yearly income from the job that you lost, before taxes?

□ Under 10.000$ □ 10.000$ – 20.000$ □ 20.000$ – 30.000$ □ 40.000$ – 50.000$ □ 50.000$ – 60.000$ □ 60.000$ or more

[Currently unemployed]
Do you currently have a job, either full-time or part-time, or not?

□ Yes □ No

[Duration unemployment]

For how many months were you unemployed after you lost your job?
{Textbox}

Occupation former job
Which occupational category best describes the job that you lost?

□ Farmer or fisherman
□ Professional (lawyer, medical practitioner, accountant, architect, etc.)
□ Owner of a shop, craftsmen, other self-employed person
□ Business proprietors, owner (full or partner) of a company
□ General management, director or top management (managing directors, director general, other director)
□ Middle management, other management (department head, junior manager, teacher, technician)
□ Employed position, working mainly at a desk
□ Employed position, not at a desk but travelling (salesmen, driver, etc.)
□ Employed position, not at a desk, but in a service job (hospital, restaurant, police, fireman, etc.)
□ Supervisor
□ Skilled manual worker
□ Other (unskilled) manual worker

Screen 10:

[Gender]
What is your gender
□ Female
□ Male

[Age]
Q27. How old are you in years?
[*Textbox*]

[Education]
What is the highest degree or level of school you have completed?
□ Less than high school
□ High School
□ Some college, no degree
□ Bachelor/ Master's degree
□ Doctoral degree

Note: As described in the main text, we recoded education into three different categories. The first category is high school or less, consisting of the two response categories "Less than high school" and "High School"; the second category is some college, no degree; and the third category is University degree or more, consisting of the two response categories "Bachelor/ Master's degree" and "Doctoral degree"

[Current income]
What is your current income range?
□ Below 20.000$ □ 20.000$ - 29,999$ □ 30.000$ – 39.999$ □ 40.000$ – 49.999$ □ 50.000$ – 60.000$ □ 60.000$ or more

[Current occupation]

Which category best describes your current job?

□ Farmer or fisherman
□ Professional (lawyer, medical practitioner, accountant, architect, etc.)
□ Owner of a shop, craftsmen, other self-employed person
□ Business proprietors, owner (full or partner) of a company
□ General management, director or top management (managing directors, director general, other director)
□ Middle management, other management (department head, junior manager, teacher, technician)
□ Employed position, working mainly at a desk
□ Employed position, not at a desk but travelling (salesmen, driver, etc.)
□ Employed position, not at a desk, but in a service job (hospital, restaurant, police, fireman, etc.)
□ Supervisor
□ Skilled manual worker
□ Other (unskilled) manual worker
□ Currently not employed full-time or part-time

Control and auxiliary variables in Study 6. We also measured a series of control and auxiliary variables. Specifically, we measured participants' duration of employment at the former company, the duration of unemployment, size of the company, former and current income, current job status, and demographic variables. We also asked participants to indicate whether they think that another worker or a machine is doing their job today, or whether they do not know what happened to their job in the meantime (1 = No, 10 = Yes). Although many participants might not be able to correctly answer this question (because they are not employed by the company any longer), we at least expected a moderately positive and significant correlation between perceived reasons for job loss in the past (our independent variables) and their belief regarding who is doing the job today. In addition, we included questions about the former and the current occupation, as well as the industry-specific commonness of workers being replaced by a robot or other workers.

Supplementary Results

Additional Analyses in Study 1A. Compared to the results reported in the main text, an analysis including participants who failed the attention check produced consistent results: 63% of the participants preferred the employees to be replaced by humans versus robots in the observer perspective condition. In the employee perspective condition, however, only 42% preferred human replacement ($\chi^2(1) = 5.46$, $P < 0.05$, $V = 0.21$, 95% CI (0.03, 0.39)).

Additional analyses in Study 1B. Compared to the results reported in the main text, an analysis including participants who failed the attention check produced consistent results: 67% of the participants preferred the employees to be replaced by humans versus robots in the observer perspective condition. In the employee perspective condition, however, only 40% preferred human replacement $\chi^2(1) = 6.58$, $P < 0.05$, $V = 0.26$, 95% CI (0.06, 0.46)).

Additional analyses in Study 3A. Compared to the results reported in the main text, an analysis including participants who failed an attention check produced consistent results. Participants displayed a preference for being replaced by software ($M = 4.60$, $t(94) = 6.3$, $P < 0.001$, $d = 0.65$, 95% CI (0.40, 0.96)), and rated robotic replacement as less threatening to their self-identity than human replacement ($M = 1.94$, $t(94) = -11.95$, $P < 0.001$, $d = -1.23$, 95% CI (-1.88, -0.86)) but more threatening to their economic future (M = 3.79, $t(94) = 1.98$, $P = 0.05$, $d = 0.20$, 90% CI (0.03, 0.37)). Moreover, a

linear regression of preference on self-threat and on future concerns revealed that participants preferred the replacement option that induced less self-threat and less future concerns (the coefficients of self-threat and future concerns were both negative). However, the coefficient of self-threat ($b = -0.845$, $t(92) = -8.12$, $P < 0.001$, 95% CI (−1.02, −0.69)) was about four times greater in magnitude compared to the coefficient of future concerns ($b = -0.196$, $t(92) = -2.14$, $P < 0.05$, 90% CI (−0.37, −0.01)).

Additional analyses in Study 3B. Compared to the results reported in the main text, an analysis including both participants who thought that technological replacement was possible in the near future and for those who did not produced consistent results (see Supplementary Table 1). Participants displayed a preference for being replaced by new technology ($M = 4.24$, $t(295) = 6.94$, $P < 0.001$, $d = 0.40$, 95% CI (0.28, 0.55)), and rated robotic replacement as less threatening to their self-identity than human replacement ($M = 2.32$, $t(295) = -12.95$, $P < 0.001$, $d = -0.75$, 95% CI (−1.09, −0.59)). Moreover, a linear regression of preference on self-threat and on future concerns revealed that participants preferred the replacement option that induced less self-threat and less future concerns (the coefficients of self-threat and future concerns were both negative). However, the coefficient of self-threat ($b = -0.751$, $t(293) = -14.50$, $P < 0.001$, 95% CI (−0.86, −0.65)) was more than two times greater in magnitude compared to the coefficient of future concerns ($b = -0.163$, $t(293) = -3.00$, $P < 0.01$, 95% CI (−0.28, −0.04)).

Additional analyses Study 4. Compared to the results reported in the main text, an analysis including participants who failed an attention check produced consistent results: being replaced by a robot (vs. by another warehouse worker) led to less self-threat ($M = 2.96$ vs. $M = 4.41$, $t(90) = -4.70$, $P < 0.001$, $d = -0.98$, 95% CI (−1.53, −0.55)) but greater concerns regarding one's own economic future ($M = 4.01$ vs. $M = 3.29$; $t(90) = 2.97$, $P < 0.01$, $d = 0.62$, 95% CI (0.21, 1.08)).

Additional analyses Study 5A. Compared to the results reported in the main text, an analysis including participants who rated the replacement scenario as not believable produced consistent results. Participants displayed a preference for being replaced by software ($M = 4.62$, $t(89) = 7.05$, $P < 0.001$, $d = 0.74$, 95% CI (0.49, 1.11)), and rated robotic replacement as less threatening to their self-identity than human replacement ($M = 1.94$, $t(89) = -13.03$, $P < 0.001$, $d = -1.37$, 95% CI (−1.99, −0.98)). Moreover, people's tendency to compare themselves less with software (vs. other humans) ($M = 1.73$, $t(89) = -19.62$, $P < 0.001$, $d = -2.07$, 95% CI (−3.11, −1.46)) explained the reduced self-threat of robotic (vs. human) replacement ($b = 0.378$, $t(88) = 2.78$, $P < 0.01$, 95% CI (0.11, 0.65)), which, in turn, drove participants' preferences for being replaced by software (vs. other humans) (indirect effect: $b = -0.383$, $Z = -2.68$, $P < 0.01$, 95% CI (−0.70, −0.16)).

Additional analyses Study 5B. Compared to the results reported in the main text, an analysis including participants who rated the replacement scenario as not believable and failed an attention check produced consistent results: being replaced by a robot (vs. by another warehouse worker) led to less self-threat ($M = 3.91$ vs. $M = 4.80$; $t(240) = -4.84$, $P < 0.01$, $d = -0.62$, 95% CI (−0.91, −0.35)). Moreover, participants rated being replaced by a robot (vs. another warehouse worker) as less self-threatening because they were less likely to compare themselves with a robot than with another worker (indirect effect: $b = 0.191$, $Z = 2.68$, $P < 0.01$, 95% CI (0.07, 0.36)).

Additional Analyses in Study 6. Comparing our main independent variables across participants with a different employment status, workers who indicated that they were currently unemployed (vs. currently employed either full-time or part time) were neither significantly more likely to attribute their job loss to human replacement, robotic replacement, nor to other reasons than those who were currently employed (either full-time or part time) (all $Ps > 0.232$). Comparing our main dependent variables across these two groups, workers who indicated they were currently unemployed (vs. currently employed either full-time or part time) did not report significantly different levels of job-loss-related self-threat ($M = 3.44$ vs. $M = 3.46$; $t(214) = -0.07$, $P = 0.95$, $d = -0.01$, 95% CI (−0.29,

0.25)), but marginally higher job-loss related future concerns (M = 4.57 vs. M = 4.23; $t(214) = 1.76$, P = 0.08, d = 0.25, 95% CI (−0.03, 0.54)).

Supplementary Table 2 documents the correlations between our main independent and dependent variables, as well as means and standard deviations. In addition to the correlations we reported in the main text, we found a significant and positive correlation between attribution of job loss to robotic and to human replacement ($r(214) = 0.15$, $P < 0.05$, 95% CI (0.02, 0.28)). Moreover, we found that attribution of job loss to other reasons is significantly and negatively correlated to both attribution of job loss to robotic ($r(214) = -0.24$, $P < 0.01$, 95% CI (−0.37, −0.11)) and to human replacement ($r(214) = -0.52$, $P < 0.01$, 95% CI (−0.63, −0.40)).

Supplementary Table 3 documents the correlations between workers´ beliefs that a machine or another worker is doing their job today and our main independent variables. The perception of workers that they had been replaced by a machine in the past was positively and significantly correlated with their beliefs that a machine is doing their job today ($r(214) = 0.70$, $P < 0.01$, 95% CI (0.56, 0.81)), but negatively and marginally significantly with their beliefs that another worker is doing their job ($r(214) = -0.11$, $P < 0.10$, 95% CI (−0.26, 0.03)). Conversely, the perception of workers that they had been replaced by another worker in the past was positively and significantly correlated with their beliefs that another worker is doing their job today ($r(214) = 0.40$, $P < 0.01$, 95% CI (0.30, 0.50)), but not significantly with their beliefs that a machine is doing their job ($r(214) = 0.06$, P = 0.42, 95% CI (−0.07, 0.19)). Thus, we found the pattern we expected: workers´ perceptions about the underlying reasons for their job loss in the past were positively and significantly correlated with beliefs regarding who is doing the job today. We acknowledge, however, that the latter measure in an imperfect validation measure because many participants might not have the necessary insights to reliably answer questions regarding the present situation at the company.

Supplementary Table 4 documents the correlations between workers´ beliefs that another worker or machine is doing their job today and our main dependent variables. We found a significant and positive relationship between job-loss-related self-threat and workers´ beliefs that another worker is doing their job today ($r(214) = 0.24$, $P < 0.01$, 95% CI (0.10, 0.36)) but no evidence for a significant relationship between their beliefs that a machine is doing their job and job-loss-related self-threat ($r(214) = 0.04$, P = 0.52, 95% CI (−0.09, 0.19)).

Study S1

In Study S1, we examined whether the observed effect of robotic (vs. human) replacement on future economic concerns is driven by perceptions that one´s skillset is becoming less needed in the labor market. Participants (N = 305, 157 male, M_{age} = 38 years, MTurk) from the US and Canada participated in a two-condition between-participants design experiment. Participants were randomly assigned to either the robotic or the human replacement condition. In the robotic replacement condition (N = 152), participants were asked to imagine that they had studied languages at college and recently started to work as a professional translator for a large international company, where their job is to translate technical product features from English into other languages. Next, participants were told that their company had informed them that, as part of a reorganization process, they would lose their job and be replaced by new software relying on artificial intelligence. In the human replacement condition (N = 153), participants read the same text but that they would be replaced by another employee. We then measured future economic concerns, our focal dependent variable ("How worried would you be about your future?", "How difficult do you think it would be for you to find another job?", and "How stressful do you think it would be for you to find another job?", 1 = Not at all, 6 = Very much, $\alpha = 0.88$). Additionally, we measured perceived skill obsolescence as a process variable ("How attractive do you think your current skillset will be in the future?", "How valuable do you think your current skills will be in the future?", and "How useful do you think your current skills will be in the future?", 1 = Not at all, 6 = Very much, $\alpha = 0.97$). Twenty-two participants rated the replacement scenario as not believable and were excluded from further analyses.

Echoing our results of Study 4, being replaced by software relying on artificial intelligence (vs. by another employee) led to greater future economic concerns (M = 4.77 vs. M = 4.44; $t(281) = 2.42$, $P < 0.05$, d = 0.29, 95% CI (0.05, 0.55)). Importantly, robotic (vs. human) replacement also induced a higher degree of perceived skill obsolescence (M = 4.22 vs. M = 3.11; $t(281) = 6.48$, $P < 0.001$, d = 0.77, 95% CI (0.50, 1.04)). A mediation model showed that the effect of robotic versus human replacement on future economic concerns is mediated by perceived skill obsolescence; that is, participants rated being replaced by a software (vs. another employee) as more threatening in terms of their economic prospects because they perceived there was decreasing demand for their skillset in the labor market (b = 0.495, Z = 5.62, $P < 0.001$, 95% CI (0.33, 0.70)).

Supplementary Tables

Supplementary Table 1. Regression analysis Study 3B

	Dependent variable: Preferences	
	Model 1: Participants who believe their current job can be replaced by technology	Model 2: Participants who do not believe their current job can be replaced by technology
Self-threat	-0.653 (0.097)	-0.799 (0.061)
Future concerns	-0.264 (0.111)	-0.127 (0.063)
Gender	-0.342 (0.328)	0.267 (0.184)
Age	0.013 (0.015)	-0.005 (0.008)
Education	0.349 (0.149)	-0.047 (0.054)
Income	-0.134 (0.107)	0.085 (0.083)
Dummy Europe [a]	0.169 (0.342)	0.322 (0.199)
Dummy other nations [a]	0.290 (1.118)	-0.039 (0.468)
Intercept	6.149 (0.991)	6.120 (0.560)
Observations	98	198
R-squared	0.461	0.569

[a] Nation dummies are to be interpreted as relative differences to the category “North America”

Supplementary Table 2. Pairwise correlations between our main independent and dependent variables in Study 6

Variables		M	SD	1	2	3	4	5
1.	Attribution of job loss to robotic replacement	2.48	2.42	1				
2.	Attribution of job loss to human replacement	4.02	3.34	.15	1			
3.	Attribution of job loss to other reasons	7.35	3.12	-.24	-.52	1		
4.	Self-threat	3.45	1.58	-.05	.26	-.05	1	
5.	Future concerns	4.36	1.35	.14	.10	.06	.27	1

Supplementary Table 3. Pairwise correlations between our main independent variables and workers´ beliefs what has happened to their job today in Study 6

Variables		1	2	3	4	5	6
1.	Attribution of job loss to robotic replacement	1					
2.	Attribution of job loss to human replacement	.15	1				
3.	Attribution of job loss to other reasons	-.24	-.52	1			
4.	Workers´ beliefs that a machine is doing their job today	.70	.06	-.24	1		
5.	Workers´ beliefs that another worker is doing their job today	-.11	.40	.01	-.14	1	
6.	No knowledge	.05	-.10	.12	.14	-.09	1

Supplementary Table 4. Pairwise Correlations between workers´ beliefs what has happened to their job today and our main dependent variables in Study 6

Variables		**1**	**2**	**3**	**4**	**5**
1.	Workers´ beliefs that a machine is doing their job today	1				
2.	Workers´ beliefs that another worker is doing their job today	-.14	1			
3.	No knowledge	.14	-.09	1		
4.	Self-threat	.04	.24	.14	1	
5.	Future concerns	.05	.09	.09	.27	1

Supplementary Table 5. Full correlation matrix for our main constructs and control variables in Study 6

	Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.	Attribution of job loss to robotic replacement	1.00													
2.	Attribution of job loss to human replacement	.15	1.00												
3.	Attribution of job loss to other reasons	-.24	-.52	1.00											
4.	Future concerns	.13	.10	.06	1.00										
5.	Self-threat	-.05	.26	-.05	.27	1.00									
6.	Time worked at former company	.05	.02	-.05	.09	-.03	1.00								
7.	Numbers of employees at former company	.15	.05	-.01	.05	.06	.13	1.00							
8.	Former income	-.03	-.03	-.01	.14	.18	.28	.27	1.00						
9.	Duration of unemployment	.02	.03	.01	.07	.02	.06	-.04	-.02	1.00					
10.	Currently unemployed [a]	.03	-.08	.06	.12	-.00	.08	.06	-.03	.30	1.00				
11.	Current income	-.04	-.01	.00	-.01	.10	.10	.16	.55	-.07	-.32	1.00			
12.	Gender [b]	.03	.02	-.07	-.03	-.16	-.09	-.06	.03	.01	-.15	-.01	1.00		
13.	Age	-.01	-.07	.01	.19	.03	.46	.14	.31	.24	.20	.14	-.08	1.00	
14.	Education	.06	.12	-.06	.13	.12	.01	.11	.23	-.03	-.12	.15	.09	.10	1.00

Notes: [a] Currently unemployed dummy coded as 0 = currently employed either full-time or part-time vs. 1 = currently unemployed. [b] Gender dummy coded as 0 = female vs. 1 = male.

APPENDIX B

Study 1

FULL TEXT OF KEY SCENARIO AND QUESTIONS

Screen 1: High symbolic value condition

Situation

Imagine you want to get a new tattoo. After you have finally chosen your tattoo, you go to a renowned tattoo studio. At this tattoo studio, you are explained that there are two different options how your tattoo can be made:

Option A:

The first option is to get your tattoo **by a tattooist** who makes the tattoo **by hand**.

Option B:

The second option is to get your tattoo **by a modern robot** which makes the tattoo **automatically**.

In this second option, a tattooist supervises the process

Extensive previous experiences of customers have shown that both options are identical (e.g. in terms of the quality of the tattoo or the pain level).

Screen 1: Low symbolic value condition

Situation

Imagine you want to remove your tattoo. After you have finally decided to get your tattoo removed, you go to a renowned clinic. At this clinic, you are explained that there are two different options how your tattoo can be removed:

Option A:

The first option is to get your tattoo removed **by a doctor** who removes the tattoo **by hand**.

Option B:

The second option is to get your tattoo removed **by a modern robot** which removes the tattoo **automatically**.

In this second option, a doctor supervises the process.

Extensive previous experiences of customers have shown that both options are identical (e.g. the quality of the tattoo removal or the pain level):

Screen 2: High (vs. low) symbolic value condition

Question

Please answer the following question
I would prefer to get my tattoo (removed)

By a tattooist (doctor) □ □ □ □ □ □ By a robot

ATTENTION CHECK

Just a short reading check. Can you remember: According to previous experiences of customers, which option is associated with a better quality of getting (removing) a tattoo?

□ To get a tattoo (removed) by a tattooist
□ There was no difference
□ To get a tattoo (removed) by a robot

Compared to the results reported in the main text, an analysis excluding participants who failed the attention check (N = 39) produced consistent results: The preference for human (vs. robotic) labor was significantly stronger in the high symbolic value condition (where the task was to make a tattoo) than in low symbolic value condition (where the task was to remove a tattoo; M_{high} = 4.77, SD = 1.58 vs. M_{low} = 4.02, SD = 1.80, $t(103) = 2.23$ $p < .05$).

PRETEST
Products are valued for different reasons. One way to distinguish products is whether they are more symbolic or more instrumental:

- Symbolic products are mainly appreciated for their symbolic value, for example in terms of expressing something about one's beliefs, traits, and personality
- Instrumental products are mainly appreciated for their instrumental value, for example in terms of the utility of their objective and tangible attributes

Please imagine that you want to **get a tattoo.** To what extent you would rate getting a tattoo as being symbolic versus instrumental?

I would rate getting a tattoo as being:

Symbolic	O	O	O	O	O	O	*Instrumental*

Now, please imagine that you want to **remove a tattoo**. To what extent you would rate removing a tattoo as being symbolic versus instrumental?

I would rate removing a tattoo as being:

Symbolic	O	O	O	O	O	O	*Instrumental*

Replication of Study 1

This study attempted to replicate the results of Study 1 with a between-participants manipulation of the service provider. Participants (N = 192, 100 female, M_{age} = 35.49, MTurk) were randomly assigned to one of four conditions in a 2(service: high vs. low symbolic value) x 2(labor: human vs. robotic) between-participants design. The stimuli and text were similar to those used in Study 1. The dependent variable was buying intentions: "In order to get this tattoo (removed), how likely would you consult this tattoo studio (clinic)" (1 = very unlikely, 6 = very likely).
A 2x2 ANOVA on buying intentions revealed a significant main effect of human labor (M_{human} = 5.24, SD = 1.10 vs. M_{robot} = 4.38, SD = 1.58, $F(1, 188) = 19.79$, $p < .0001$) and of symbolic value (M_{high} = 4.61, SD = 1.59 vs. M_{low} = 5.00, SD = 1.23, $F(1, 188) = 4.02$, $p < .05$), which was qualified by a significant interaction effect ($F(1, 188) = 6.40$, $p < .05$). In the high symbolic value service condition, participants were more willing to go to the tattoo studio if a person versus a robot makes the tattoo (M_{human} = 5.29, SD = 1.04 vs. M_{robot} = 3.94, SD = 1.73, $F(1, 188) = 24.06$, $p < .0001$), but this was attenuated in the low symbolic value service condition of tattoo removal (M_{human} = 5.19, SD = 1.16 vs. M_{robot} = 4.82, SD = 1.29, $F(1, 188) = 1.87$, $p = .174$).

FULL TEXT OF KEY SCENARIO AND QUESTIONS

Screen 1: High symbolic value condition

Situation

Imagine you want to get a new tattoo. After you have finally chosen your tattoo, you go to a renowned tattoo studio.

At this tattoo studio, you are explained that you would get your tattoo **by a specialized tattooist (robot)** who (which) makes the tattoo **by hand (automatically)**.

(To avoid complications, a tattooist supervises the process).

Extensive previous experiences of customers have shown that this is a very professional tattoo studio, e.g., it delivers tattoos of great quality.

Screen 1: Low symbolic value condition

Situation

Imagine you want to remove your tattoo. After you have finally decided to get your tattoo removed, you go to a renowned clinic.

At this clinic, you are explained that you would get your tattoo removed **by a specialized doctor (robot)** who (which) removes your tattoo **by hand (automatically)**.

(To avoid complications, a doctor supervises the process).

Extensive previous experiences of customers have shown that this is a very professional clinic, e.g. it removes tattoos with great quality.

Screen 2: High (vs. low) symbolic value condition

Question

Please answer the following question

In order to get your tattoo (removed), how likely would you consult this tattoo studio (clinic)?

Very unlikely □ □ □ □ □ □ Very likely

Study 2

FULL TEXT OF KEY SCENARIO AND QUESTIONS

Screen 1: More symbolic consumption context condition

Situation

Imagine you are working as a doctor. For your medical office, you want to buy a printed poster of a human skull. You intend to use this printed poster of a human skull to **decorate your office** (e.g. **to improve the interior design** of your room where you receive patients).
On the next screen, you see two pictures of a printed poster you could buy to **decorate your office**.

The printed poster on the left was designed by **a painting algorithm relying on artificial intelligence**

(human painter). The printed poster on the right was designed by a **human painter (painting algorithm relying on artificial intelligence)**.

Screen 1: Less symbolic consumption context condition

Situation

Imagine you are working as a doctor. For your medical office, you want to buy a printed poster of a human skull. You intend to use this printed poster of a human skull to **educate patients** (e.g. to **explain anatomical details** to your patients)**.**

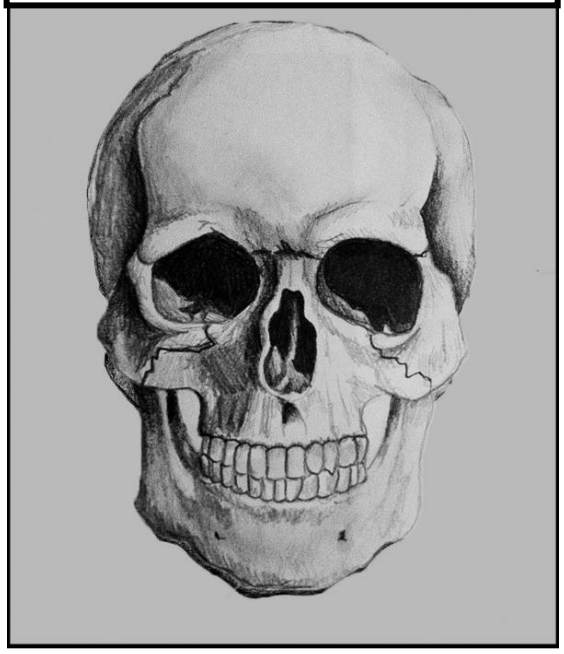
On the next screen, you see two pictures of a printed poster you could buy to **educate patients**.

The printed poster on the left was designed by a **painting algorithm relying on artificial intelligence (human painter)**. The printed poster on the right was designed by a **human painter (painting algorithm relying on artificial intelligence)**.

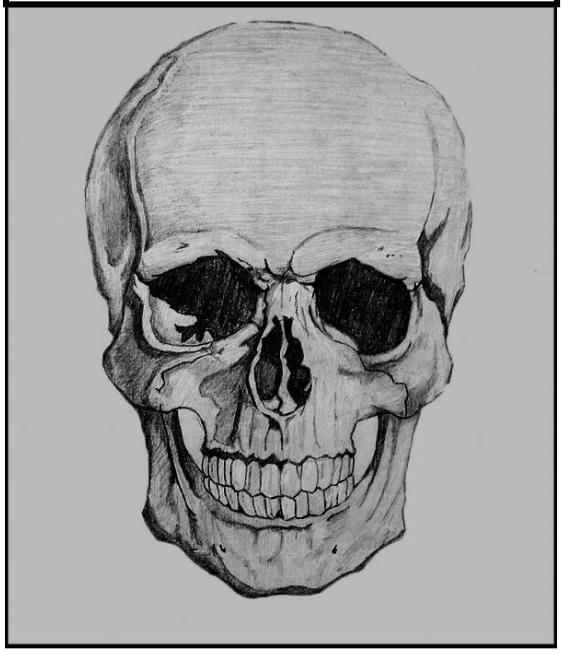
Screen 2: More (vs. less) symbolic consumption context condition

Below, you see the two pictures of a printed poster of a human skull you could buy:

This printed poster was designed **by a painting algorithm (human painter)**



This printed poster was designed **by a human painter (painting algorithm)**



Question

Please answer the following question

Which of the two printed posters would you more likely buy to decorate (vs. educate) your office?

I would much more likely buy the printed poster designed by **a painting algorithm (human painter)**	□ □ □ □ □ □ □	I would much more likely buy the printed poster designed by **a human painter (painting algorithm)**

Study 3

FULL TEXT OF KEY SCENARIO AND QUESTIONS

Screen 1: More symbolic consumption context condition

Situation

Imagine you are working as a doctor. For your medical office, you want to buy a poster of a human skull. You intend to use this poster of a human skull to **decorate your office** (e.g. **to improve the interior design** of your room where you receive patients).

On the next screen, you see two pictures of a poster you could buy to **decorate your office**.

The poster on the left was drawn by a **drawing robot (human painter)**. The poster on the right was drawn by a **human painter (drawing robot)**.

Screen 1: Less symbolic consumption context condition

Situation

Imagine you are working as a doctor. For your medical office, you want to buy a poster of a human skull. You intend to use this poster of a human skull to **educate patients** (e.g. to **explain anatomical details** to your patients)**.**

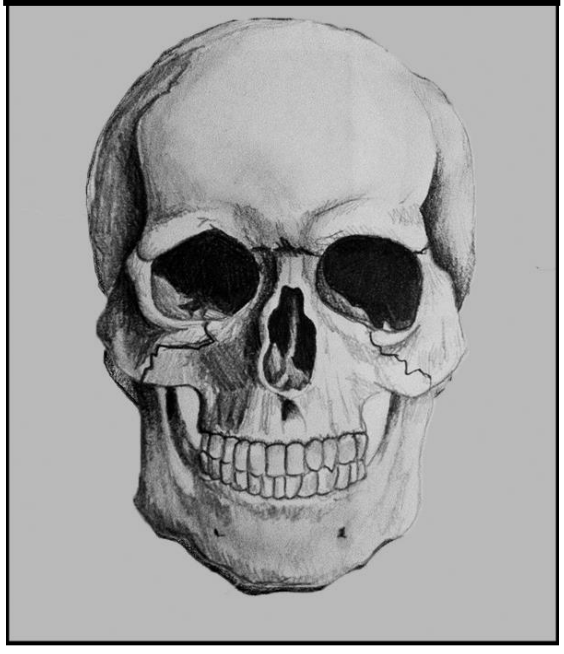
On the next screen, you see two pictures of a poster you could buy to **educate patients**.

The poster on the left was drawn by a **drawing robot (human painter)**. The poster on the right was drawn by a **human painter (drawing robot)**.

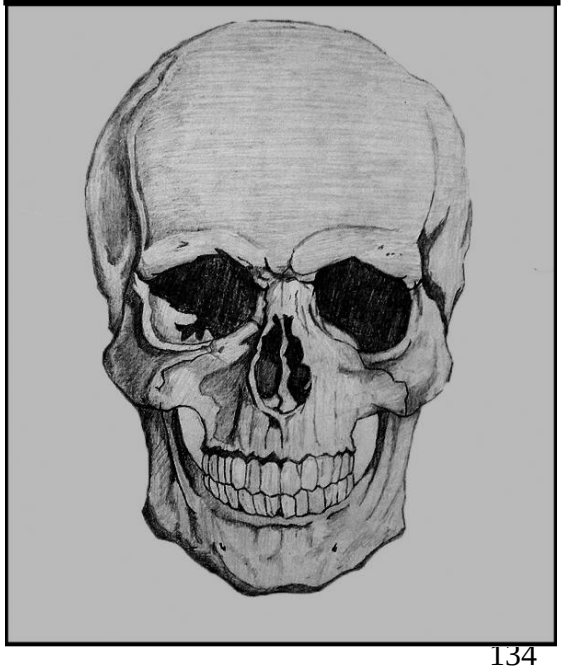
Screen 2: More (vs. less) symbolic consumption context condition

Below, you see the two pictures of a poster of a human skull you could buy:

This poster was drawn
by a drawing robot (human painter)



This poster was drawn
by a human painter (drawing robot)



Question

Please answer the following question

Which of the two posters would you more likely buy to decorate (vs. to educate) your office?

I would much more likely buy the poster drawn by **a drawing robot (human painter)**	□ □ □ □ □ □ □	I would much more likely buy the poster drawn by **a human painter (drawing robot)**

Screen 3: [Need for uniqueness]

Now, we are interested in how you respond to the following questions:

	Strongly disagree				Strongly agree
I collect unusual products as a way of telling people I'm different	□	□	□	□	□
I have sometimes purchased unusual products or brands as a way to create a more distinctive personal image	□	□	□	□	□
I often look for one-of-a-kind products or brands so that I create a style that is all my own	□	□	□	□	□
Often when buying merchandise, an important goal is to find something that communicates my uniqueness	□	□	□	□	□
I often combine possessions in such a way that I create a personal image for myself that can't be duplicated	□	□	□	□	□
I often try to find a more interesting version of run-of-the-mill products because I enjoy being original	□	□	□	□	□
I actively seek to develop my personal uniqueness by buying special products or brands	□	□	□	□	□
Having an eye for products that are interesting and unusual assists me in establishing a distinctive image	□	□	□	□	□
The products and brands that I like best are the ones that express my individuality	□	□	□	□	□
I often think of the things I buy and do in terms of how I can use them to shape a more unusual personal image	□	□	□	□	□
I'm often on the lookout for new products or brands that will add to my personal uniqueness	□	□	□	□	□

Study 4

FULL TEXT OF KEY SCENARIO AND QUESTIONS

Screen 1 - More symbolic product component condition:

Situation

Consider you are looking for a new **frame** for your eyeglasses.
To buy your new frame, you go to a store that has very good customer reviews.

This store offers many different types of frames, such as angular or oval frames (see some examples below).

Screen 1 - Less symbolic product component condition

Situation

Consider you are looking for new **lenses** for your eyeglasses.
To buy your new lenses, you go to a store that has very good customer reviews.

This store offers many different types of lenses, such as single vision lenses or high index lenses (see some examples below).

Screen 2 - More (vs. less) symbolic product component condition

Situation

After you have tried out a number of different frames (vs. lenses) together with the salesperson, you have found a frame (vs. lenses) you really like (and that perfectly fits your style [vs. that perfectly corrects your vision problems]).

Now, the salesperson tells you that there are two different ways how this frame (vs. these lenses) you have chosen can be produced:

Option A:
The frame (vs. lenses) of your eyeglasses can be produced **automatically by a robot (robot-made).**

Option B:
The frame (vs. lenses) of your eyeglasses can be produced **by a human (human-made)**.

The salesperson tells you that the eyeglasses cost $250, irrespectively of how you choose the frame (vs. lenses) of this pair of eyeglasses to be made.

Question

I would prefer the frame (vs. lenses) of my eyeglasses to be

produced by a robot □ □ □ □ □ □ produced by a human

I want the frame (vs. lenses) of my eyeglasses to be

standard	□	□	□	□	□	□	□	original
common	□	□	□	□	□	□	□	uncommon
regular	□	□	□	□	□	□	□	special
typical	□	□	□	□	□	□	□	atypical

Screen 3 - More (vs. less) symbolic product component condition

Now we would be interested in which other factors you think are important for the frame (vs. lenses) of your eyeglasses

	Strongly disagree						Strongly agree
[Product quality] The frame (vs. lenses) of my eyeglasses should be of high-quality	□	□	□	□	□	□	□
[Love 1] The frame (vs. lenses) of my eyeglasses should be warmhearted	□	□	□	□	□	□	□
[Love 2] The frame (vs. lenses) of my eyeglasses should be full of passion	□	□	□	□	□	□	□
[Love 3] The frame (vs. lenses) of my eyeglasses should be full of love	□	□	□	□	□	□	□

Screen 4 - More (vs. less) symbolic product component condition

[Component importance]
If you were looking for new eyeglasses, how important would the frame (vs. lenses) be to you?

Not important at all □ □ □ □ □ □ □ Very important

[Current manufacturing procedures]
Do you think that frames (vs. lenses) of eyeglasses today are typically manufactured relying on...

…robotic production □ □ □ □ □ □ □ …human production

Supplementary Table 1. Pairwise correlations between our main independent variable and our mediator variables in Study 4

Variables	**1**	**2**	**3**	**4**	**5**	**6**
1. Preferences	1					
2. Uniqueness motives	.39**	1				
3. Love	.13	.32**	1			
4. Product quality	-.17*	-.18*	.03	1		
5. Component importance	.12	.12	-.03	.21**	1	
6. Current manufacturing procedures	.35**	.24**	.03	-.18*	.11	1

Notes: * $P < 0.05$. ** $P < 0.01$

PRESTEST 1

Products are valued for different reasons. One way to distinguish products is whether they are more symbolic or more instrumental:

- Symbolic products are mainly appreciated for their symbolic value, for example in terms of expressing something about one's beliefs, traits, and personality
- Instrumental products are mainly appreciated for their instrumental value, for example in terms of the utility of their objective and tangible attributes

Now, please think of the **frame** of eyeglasses. To what extent you would rate the frame of eyeglasses as being symbolic versus instrumental?

I would rate the frame of eyeglasses as being:

Symbolic O O O O O O *Instrumental*

Now, please think of the **lenses** of eyeglasses. To what extent you would rate the lenses of eyeglasses as being rather symbolic versus instrumental?

I would rate the lenses of eyeglasses as being:

Symbolic O O O O O O *Instrumental*

PRESTEST 2

Screen 1:

Situation

Consider you are looking for a new **frame** for your eyeglasses.
There are many different types of frames, such as angular or oval frames (see some examples below).

There are two different ways how a frame for your eyeglasses can be produced:

Option A:
The frame of your eyeglasses can be produced **automatically by a robot (robot-made).**

Option B:
The frame of your eyeglasses can be produced **by a human (human-made)**.

Questions

The frame of my eyeglasses would be

	…if it was produced by a robot						…if it was produced by a human
more original…	□	□	□	□	□	□	□
more uncommon…	□	□	□	□	□	□	□
more special…	□	□	□	□	□	□	□
more atypical…	□	□	□	□	□	□	□

Screen 2:

Situation

Consider you are looking for new **lenses** for your eyeglasses.
There are many different types of lenses, such as single vision lenses or high index lenses (see some examples below).

There are two different ways how these lenses can be produced:

Option A:
The lenses of your eyeglasses can be produced **automatically by a robot (robot-made).**

Option B:
The lenses of your eyeglasses can be produced **by a human (human-made)**.

Questions

The lenses of my eyeglasses would be

	…if they were produced by a robot						…if they were produced by a human
more original…	□	□	□	□	□	□	□
more uncommon…	□	□	□	□	□	□	□
more special…	□	□	□	□	□	□	□
more atypical…	□	□	□	□	□	□	□

APPENDIX C

SCENARIOS

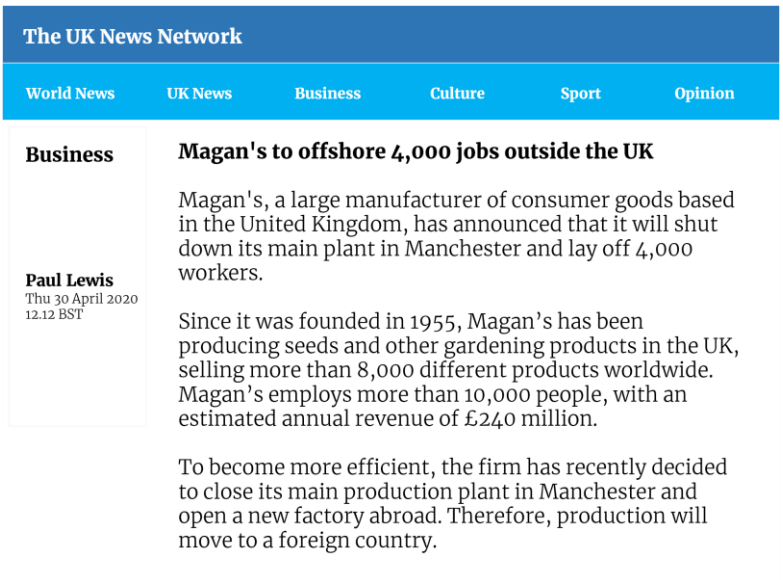
Study 2:

Procedure

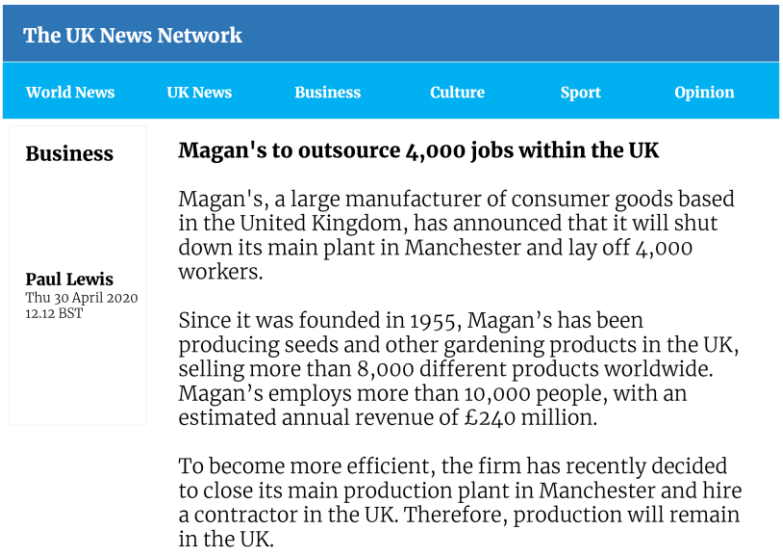
On the next page, you will receive a news release about a UK firm that recently laid off 4,000 workers in the UK. This news release also describes the reasons why the firm did so.

Please take your time to read this news release carefully. Then, press the continue button (which will appear after 20 seconds), and answer the questions that follow.

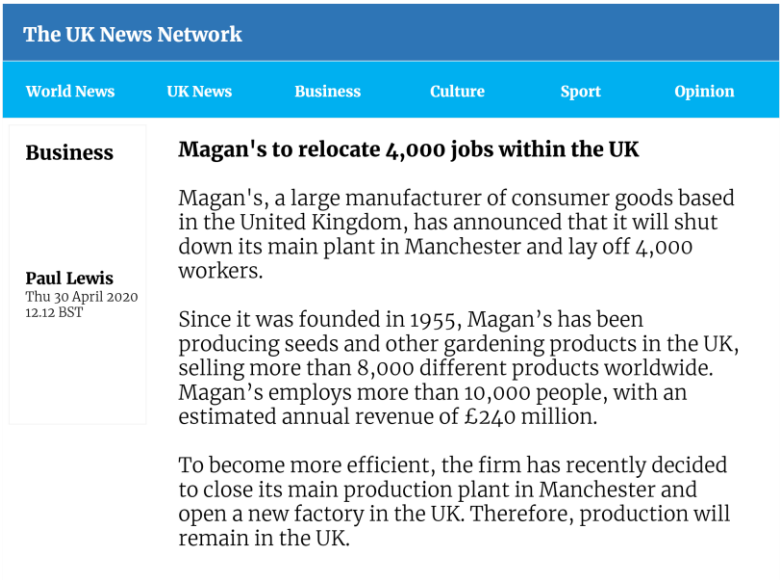
News release – Offshoring condition



News release – Outsourcing condition



News release – Relocation condition



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Business

Paul Lewis
Thu 30 April 2020
12.12 BST

Magan's to relocate 4,000 jobs within the UK

Magan's, a large manufacturer of consumer goods based in the United Kingdom, has announced that it will shut down its main plant in Manchester and lay off 4,000 workers.

Since it was founded in 1955, Magan's has been producing seeds and other gardening products in the UK, selling more than 8,000 different products worldwide. Magan's employs more than 10,000 people, with an estimated annual revenue of £240 million.

To become more efficient, the firm has recently decided to close its main production plant in Manchester and open a new factory in the UK. Therefore, production will remain in the UK.

Study 3:

Situation

Magan's is a large manufacturer of consumer goods based in the **United Kingdom**.

Since it was founded in 1955, Magan's has been producing seeds and other gardening products in the UK, selling more than 8000 different products worldwide. Magan's employs more than 10,000 employees, with an estimated annual revenue of £240 million.

[Page break]

Foreign customer location	**Domestic customer location**	**Control**
Situation What is remarkable about the firm is that **more than 90%** of its customers are **not** from the United Kingdom. **Thus, almost all of their customers come from outside the UK**. To become more efficient, the firm has recently decided to offshore its main production overseas. The firm will therefore lay off 4000 workers in its UK plant and open a new production plant abroad.	**Situation** What is remarkable about the firm is that **more than 90%** of its customers are from the United Kingdom. **Thus, almost all of their customers come from the UK**. To become more efficient, the firm has recently decided to offshore its main production overseas. The firm will therefore lay off 4000 workers in its UK plant and open a new production plant abroad.	**Situation** To become more efficient, the firm has recently decided to offshore its main production overseas. The firm will therefore lay off 4000 workers in its UK plant and open a new production plant abroad.

Study 4A:

<table>
<tr><th>Offshoring</th><th>Declining demand</th></tr>
<tr><td colspan="2">Domestic firm

Situation: The firm is a large manufacturer of different industrial goods with its headquarters and main production location in the US. It is a supplier for many industries including the automotive and aviation industry.
The firms considers different options to increase its efficiency.</td></tr>
<tr><td>(Next page:) The US firm has recently decided to move its main production from the US to overseas.
The firm plans to restructure its existing production plant in the US and open a new production plant abroad and rely exclusively on work done by foreign workers.
The firm will lay off 2000 workers in its US plant.
The quality of production will not change.</td><td>(Next page:) The US firm has recently decided to keep its main production in the US.
The firm plans to restructure its existing production plant in the US as it is facing a severe drop in sales.
The firm will lay off 2000 workers in its US plant.
The quality of production will not change.</td></tr>
<tr><td colspan="2">Foreign firm

Situation: The firm is a large manufacturer of different industrial goods with its headquarters overseas and main production location in the US. It is a supplier for many industries including the automotive and aviation industry.
The firms considers different options to increase its efficiency.</td></tr>
<tr><td>(Next page:) The foreign firm has recently decided to move its main production from the US to overseas.
The firm plans to restructure its existing production plant in the US and open a new production plant abroad and rely exclusively on work done by foreign workers.
The firm will lay off 2000 workers in its US plant.
The quality of production will not change.</td><td>(Next page:) The foreign firm has recently decided to keep its main production in the US.
The firm plans to restructure its existing production plant in the US as it is facing a severe drop in sales.
The firm will lay off 2000 workers in its US plant.
The quality of production will not change.</td></tr>
</table>

Study 4B:

<table>
<tr><th>Offshoring</th><th>Automation</th></tr>
<tr><td colspan="2">Domestic firm

Situation: The firm is a large manufacturer of different industrial goods with its headquarters and main production location in the US. It is a supplier for many industries including the automotive and aviation industry.
The firms considers different options to increase its efficiency.</td></tr>
<tr><td>(Next page:) The US firm has recently decided to move its main production from the US to overseas.
To increase efficiency, the firm plans to open a new production plant abroad and rely exclusively on work done by foreign workers.
The firm will lay off 4000 workers in its US plant.
The quality of production will not change.</td><td>(Next page:) The US firm has recently decided to keep its main production in the US.
To increase efficiency, the firm plans to convert its existing production plant in the US and rely exclusively on automated work done by machines.
The firm will lay off 4000 workers in its US plant.
The quality of production will not change.</td></tr>
<tr><td colspan="2">Foreign firm</td></tr>
</table>

Situation: The firm is a large manufacturer of different industrial goods with its **headquarters in Germany and main production location in the US**. It is a supplier for many industries including the automotive and aviation industry. The firms considers different options to increase its efficiency.	
(Next page:) **The German firm has recently decided to move its main production from the US to overseas.** To increase efficiency, the firm plans to **open a new production plant abroad** and rely exclusively on work done by **foreign workers.** The firm will lay off 4000 workers in its US plant. The quality of production will not change.	*(Next page:*) **The German firm has recently decided to keep its main production in the US.** To increase efficiency, the firm plans to convert its existing production plant in the US and **rely exclusively on automated work done by machines.** The firm will lay off 4000 workers in its US plant. The quality of production will not change.

Example of negatively related text-based summary of available media coverage on a collective layoff case (Study 1)

"Akzo Nobel, a multi-national firm that produces paint and coatings, has announced that it is to close its site in Darwen in Lancashire with the loss of approximately 100 jobs. Industrial paint is produced at the Darwen site and production will be 'offshored' to Sweden. Management at Akzo Nobel attributed the job losses to pressures within the UK manufacturing sector, and also stated that they would attempt to keep job losses as low as possible. An official from the GMB trade union said that the decision had come after a strategic review in Akzo Nobel's head offices in Amsterdam in the Netherlands. The official also stated, 'We are bitterly disappointed at this announcement and we will fight this all the way. The jobs will not be lost without a fight. We will make it very clear that this is the wrong decision for the company… Akzo Nobel portrays itself as a socially responsible company but this will have a very negative impact on Darwen…There are few skilled jobs around and these job losses will be felt hard. We were told jobs were safe and this is a huge blow to the hard-working staff here.' Akzo Nobel employs 62,000 internationally. As of February 2008 there is no information on when the job losses will be implemented by." [Sentiment score: −0.96]