Man Versus Machine: Resisting Automation in Identity-Based Consumer Behavior

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Abstract
Automation is transforming many consumption domains, including everyday activities like cooking or driving, and recreational activities like fishing or cycling. Yet, little research in marketing has examined consumer preferences for automated products. Automation often provides obvious consumption benefits, but six studies spanning a variety of product categories show that automation may not be desirable when identity motives are important drivers of consumption. Using both correlational and experimental designs, the findings demonstrate that individuals who strongly identify with a particular social category resist automated features when these features hinder the attribution of identity-relevant consumption outcomes to oneself. These findings have substantial theoretical implications for research on identity and on technology, as well as managerial implications for targeting, product innovation, and communication.

Keywords: Automation, Identity, Technology, Self, Attribution
Many of today’s products are yesterday’s science fiction. Only few years ago, it was hard to imagine the mass diffusion of domestic robots or voice-controlled virtual assistants. Products are increasingly able to automate tasks that previously consumers had to perform themselves. For instance, a new generation of cooking machines can prepare ingredients and implement hundreds of recipes (e.g., Vorvex’s Thermomix “does all the hard work and you're along for the ride”). Even more strikingly, Google’s self-driving cars have already travelled over a million miles on American roads. These are among the latest examples of a decades-long trend towards increasing automation. For example, automation has a long history in both cooking products (e.g., food processors) and cars (e.g., automatic transmission). This trend is only bound to increase. IBM, Google, and Intel have recently acquired start-ups working on artificial intelligence, a crucial technology in the development of autonomous products and services. This interest reflects the vast efficiency gains that automation can bring to consumers. Automation frees consumers from the need to perform tasks that require time and energy; in turn allowing consumers to spend fewer resources to achieve outcomes that often match, and sometimes exceed, those achieved without relying on automation.

Although the advantages of automation are unquestionable, automation may not be universally desirable. Anecdotally, some products with automated features are controversial among hobbyists and fans in areas as diverse as fishing (sonar fish finders) and baking (bread-baking machines). We argue that automation is desirable when people seek to maximize convenience but that it is not inherently valuable in the case of identity-based consumption. One of the most important ideas to emerge from the past three decades of consumer research is that consumption decisions are often rooted in our desire to confirm and express who we are (Reed et al. 2012). Our key contention is that individuals who strongly identify with a particular social category resist automated features when these features hinder the attribution of identity-relevant consumption outcomes to oneself. In other words, by
replacing skills associated with a given identity, automation removes the possibility for consumers to internalize the outcomes of the consumption experience, and is thus detrimental for identity-based consumption. For example, relying on a bread-baking machine to bake bread prevents the user from being able to attribute the quality of the resulting bread to her or his knowledge of baking conditions and ability to shape the bread. If identity motives play a role in the decision to make bread, this should make bread-baking machines less desirable. To test these ideas, we conducted six studies spanning a variety of product categories (vehicles, fishing devices, kitchen appliances), methods (surveys of real choices, experiments), and samples (several online and offline participant pools).

Our paper is the first to focus on consumer reactions to automation and makes a number of important contributions. First, we contribute to the broader literature on automation. Economists and sociologists have paid much attention to the phenomenon of automation (Erikson 1986; Parasuraman and Riley 1997; Rifkin 1996). However, this literature has mostly taken a supply-side perspective and examined the consequences of automation in production for workers, unemployment, and societal welfare. In contrast, we draw attention to the consequences of automation in the domain of consumption, highlighting previously undocumented effects of automation in the marketplace. Second, we contribute to the marketing literature on technology by complementing existing research on the dark side of technology (e.g., Etkin 2016; Mick and Fournier 1998; Wilcox and Stephen 2013) and by answering recent calls for research on how technology impacts identity-based consumer behavior (Reed et al. 2012). Third, we contribute new theorizing on consumer identity. The vast literature on identity-based consumption predominantly focuses on how product choice and product display enable consumers to express who they are and the groups they belong to (Belk 1988; Oyserman 2009a; Reed et al. 2012). However, there is more to identity-based consumption than acquiring or displaying products. “Performing” an identity often requires a
specific set of skills and the engagement in identity-relevant tasks (Oyserman 2009b; Reed et al. 2012). For example, fishing products help anglers construct their identity by enabling a specific behavioral repertoire, including baiting, casting, and reeling. Thus, we contribute to the identity literature by highlighting the importance of internal attribution of consumption outcomes in identity-based consumption.

Finally, our paper offers important guidelines for marketers. Automation has been a crucial trend in consumer markets for decades but academic marketing research provides little practical guidance on this topic. Our findings offer actionable insights at the planning and R&D stages of the product development process. Product-centric firms should conceive automation as a mean to increase efficiency in product usage, but also as a factor that can constrain the success of identity-relevant products. Customer-centric firms should consider a target segment's identity motives when deciding which tasks currently performed by consumers are good candidates for further automation. Moreover, at the product launch stage managers should consider whether emphasizing internal attribution of consumption outcomes in communication and advertising could increase the chances of product adoption by identity-motivated consumers.

AUTOMATION: FROM PRODUCTION TO CONSUMPTION

Social scientists have been interested in the phenomenon of automation since the Industrial Revolution. Division of labor in the assembly line made it possible for work to be performed by machines with decreasing engagement by human workers. In his *Economic and Philosophic Manuscripts* of 1844, Karl Marx famously contended that mechanization alienates workers by depriving them of the meaning of their work. Since then, machines have vastly improved in terms of sophistication and effectiveness as a (cheaper) replacement of
human labor, and academic interest has never ceased. Today, scholars in economics and sister disciplines are engaged in an intense debate about the effects of the current wave of automation on labor markets, mostly focusing on employment effects.

Many economists stress that throughout history automation not only substituted, but also complemented human labor (e.g., Autor 2015), ultimately creating more jobs than it destroys. Others are less optimistic and claim that automation increasingly takes forms (i.e., artificial intelligence) that might make human labor obsolete and dehumanize society as a whole (cf., Mokyr, Vickers, and Zeibarth 2015). These issues are among today’s most important and polarizing and have broad resonance outside academic circles (Brynjolfsson and McAfee 2014; Ford 2015; The Economist 2016). We complement this debate by taking a different angle on the phenomenon of automation, and investigate how consumers react to automation in the marketplace. How do consumers react to product features that automate consumption tasks that they would otherwise perform?

Given the ubiquity of automated products, it is tempting to conclude that consumers always value automation. After all, using cooking machines and electric bikes frees up time and energy that consumers can spend on other activities. Ceteris paribus, automation improves the benefit-cost trade-off by reducing the costs of consumption and often guaranteeing similar benefits. However, a perspective that assumes that consumers solely maximize the final outcomes of consumption is overly simplistic.

A large body of research shows that consumers often pursue motives other than maximizing consumption outcomes. In particular, consumers not only care about the outcomes of consumption, but also about the process that leads to such outcomes (Frey and Stutzer 2005). For instance, people choose to climb mountains not only for the view, but also for the challenge of getting to the top (Loewenstein 1999). Whereas automation positively
affects the pursuit of consumption outcomes by making them easier to achieve, we argue that when consumption is driven by identity motives, consumers might resist automated products.

IDENTITY AND THE DIAGNOSTICITY OF CONSUMPTION

Consumer behavior is often driven by identity motives, as documented in psychology and marketing. Identity can be defined as any category label that the consumer self-associates with (Reed et al. 2012). This category label represents what “kind” of person the consumer is, as well as the behaviors she or he engages in (Oyserman 2009b). People are inherently motivated to construct their identities (Oyserman 2009a), and use products to confirm and express the identities that they hold (e.g., Belk 1988; Berger and Heath 2007; Weiss and Johar 2013). An important factor that influences whether consumers are likely to engage in identity-based consumption is the chronic accessibility of the identity, typically referred to as strength of identification (Deshpandé and Stayman 1994). Greater strength of identification makes consumers more sensitive to information relevant to an identity (e.g., cues in advertising), more likely to purchase identity-relevant products (e.g., Deshpande, Hoyer, and Donthu 1986), and more likely to engage in behaviors that directly implicate the identity (Reed et al. 2012).

Strong identifiers value the opportunity to engage in behaviors associated with their target identity, because these behaviors act as signals to the self (Bem 1972; Bodner and Prelec 2003; Khan and Dhar 2006). According to self-signaling theory (Bodner and Prelec 2003), choices depend on outcome utility (i.e., the utility associated with the outcomes of consumption) and diagnostic utility (i.e., the utility of knowing the type of person one is). Consumers can thus boost diagnostic utility by taking identity-relevant actions to self-signal that they hold certain identities, and this can be independent of outcome utility.
Psychologically, we maintain that the signaling utility of performing identity-relevant activities is gained via a process of internal attribution. According to attribution theory, people can use either internal or external explanations for a given outcome (Cheng and Novick 1990). Feelings of internal attribution require the experience of agency and control over one’s actions (Menon et al. 1999), as people cannot credit their actions as the cause of outcomes when they do not have control over the consumption process. For example, when feelings of control are low, consumers are less open to new products, perhaps because new products challenge consumers’ perceived mastery (Faraji-Rad, Melumad, and Johar 2017), and prefer products that require high effort, because these products allow consumers to internally attribute positive outcomes (Cutright and Samper 2014).

Although the desire for internal attribution of positive outcomes is a very robust psychological tendency, it is by no means uniform across people (Mezulis et al. 2004). We propose that within the identity domain, strong identifiers have an especially high need for internal attribution, and thus value highly the self-signaling utility of performing tasks that are diagnostic of their identity. One factor that characterizes the degree to which a consumption activity is diagnostic of the consumer’s identity is its “difficulty,” or the degree to which it requires using acquired skills or exerting effort (Stets and Burke 2000). Because difficult activities are by definition less attainable by people who lack skills or will not put effort, they become particularly diagnostic of the identity of those who are able and willing to perform them. In sum, strong identifiers can harness the self-signaling utility of consumption by internally attributing consumption outcomes to their skillful or effortful actions.

**IDENTIFIERS RESIST AUTOMATION**
Automation often replaces skills that are instrumental to self-signaling an identity. For example, a bread-baking machine bakes the bread automatically with minimal involvement from consumers. These machines can direct the user on ingredients, control temperature, and set timing, and thus replace skills essential to the baker identity. When automation replaces skill or effort, it removes opportunities for internal attribution. Thus, we predict that (1) strong identifiers find products less appealing if they automate identity-relevant tasks because (2) strong identifiers have a higher need for internal attribution. To this phenomenon and mediating process, we add two important qualifications.

First, we do not argue that strong identifiers are modern-day Luddites. That is, strong identifiers should not be opposed to technology per se. Automating tasks that are not especially diagnostic of one’s identity should not prevent internal attribution of consumption outcomes, and thus automation should not be opposed by strong identifiers. For example, dough-kneading machines automate the repetitive task of kneading the dough prior to baking, a task that does not necessarily help distinguishing skilled from less skilled bakers. Therefore, many amateur bakers might resist adoption of bread-baking machines, but not of dough-kneading machines. This proposition parallels the finding that healthy young people are more reluctant to take pharmaceutical enhancements when enhancements affect fundamental psychological traits than when they do not (Riis, Simmons, and Goodwin 2008).

Second, we do not argue that people’s consumption motives are necessarily the same across situations. Accordingly, strong identifiers should only be opposed to automation when they consume in the target product category for identity reasons. If in a given situation a consumer is motivated by non-identity reasons (e.g., convenience), then automation may be valued by strong identifiers similarly to the way it is generally valued by weak identifiers. For example, a keen cyclist may decide to buy another bike to commute to work in order to avoid slow traffic or save money. In this situation, the consumer may be attracted by features like a
battery pack for assisted pedaling in order to make the ride to work faster or avoid arriving sweaty at the office. In contrast, the same person may never consider this product when buying a bike to use on recreational weekend rides. This proposition is consistent with the view of consumer choices as driven by the relative activation of different goals (van Osselaer et al. 2005).

In the reminder of the paper, we present a series of studies demonstrating that strength of identification is an important determinant of preference for automation in identity-relevant contexts (see Table 1 for overview and main findings). The findings also provide insight into why and when this is the case. In all studies, data collection was subjected to predetermined stopping rules (target sample sizes in online studies; number of experimental sessions in lab studies). We excluded no participants from the analyses unless specified, and report results concerning all the conditions and dependent measures collected.

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**STUDY 1: DRIVING**

Study 1 has two objectives. The first is to test our key proposition by examining the link between strength of identification and actual choice for automation in identity-relevant contexts. The study deals with cars, and in particular with drivers’ choices about whether to purchase a car with manual or automatic transmission. In cars with manual transmission, the driver needs to change gear by pressing the clutch pedal and moving the gear lever. In cars with automatic transmission, a computer changes the gear and the driver does not need to perform any action. Manual transmission allows drivers to directly affect the engine’s torque, and the act of shifting gears may bring significant self-signaling utility to consumers who are interested in driving per se, rather than as a means of transportation. For example, Spyker
Cars, a niche Dutch company targeting rich driving enthusiasts, resisted introducing automatic transmission for years due to concerns about this feature’s inconsistency with the practice of skillful driving (the company eventually relented because the lack of automatic transmission was impeding sales in China). Thus, we predict that people with stronger identification in driving would be more likely to own a car with manual transmission.

The second objective is to demonstrate that identification predicts automation choice even after taking into account potential explanations for this effect other than internal attribution. For example, in most cases strength of identification correlates with expertise and one could argue that the effect of identification stems from the greater ease with which strong identifiers can operate manual transmission. Moreover, strong identifiers might be more likely than weak identifiers to perceive the outcomes of the automation to be worse than those without automation. Hence, they might resist automation because they do not trust it. In this study, we aim to show that identification remains a significant predictor of automation choice after controlling for participant’s expertise and beliefs about outcomes.

**Method**

The study was conducted in two phases. In phase one, we conducted a survey to measure the independent variable (strength of identification) and other relevant screening variables (e.g., possessing a driving license). In phase two, we recruited participants from phase one who fulfilled the screening criteria and collected our focal dependent variable plus further control variables (see below). Most notably, we assessed two potentially relevant variables that correlate with identity strength (i.e., expertise) and with automation (e.g., “outcome quality”, i.e., the expected performance of automatic vs. manual transmission).

In phase one, we recruited 2,431 participants of US nationality on Prolific (1,119 females, M\text{age} = 31.0, SD = 11.15), an online participant pool that has been demonstrated to provide particularly high-quality data for behavioral research (Peer et al. 2016). This phase of
the study spanned over four months (between December 2016 and March 2017). Participants were asked to complete a study that contained two parts. The first part was an unrelated study while the second part included the focal measures. The study was presented as a survey of personal interests and, to support the cover story, participants rated their interest in a range of hobbies and activities (e.g., baking, gaming). This part included a measure of strength of identification as a driver. Participants rated their level of agreement with three statements: “I am really into driving,” “I identity myself as a driver,” “Driving is one of my favorite hobbies,” (7-point; α = .88 in our final sample). Participants were also asked few questions (see below) regarding driving and car ownership, to use as eligibility criteria for phase two.

Phase two started two months after the end of phase one (i.e., in May 2017). The study description made no reference to the phase one survey. The time between the measurement of the independent and dependent variables thus ranged between about two and six months. In the second phase, we invited all of the 267 participants (96 females, M_{age} = 38.1, SD = 12.24) who satisfied the following criteria to participate. To be eligible for inclusion in our final sample, participants had to: (1) have a driving license and own a car; (2) be the person in the household who chose the car (to be able to match driver’s strength of identification and car choice); (3) have bought a new car (vs. used, to minimize the role of irrelevant situational concerns such as bargain hunting in the purchase; Guiot and Roux 2010); and (4) know how to operate manual transmission. We obtained a 56% response rate, resulting in a final sample of 150 participants (55 females, M_{age} = 40.1, SD = 12.60). There was no difference in strength of identification as drivers between those who responded to our invitation to participate in the phase two survey and those who did not (p = .27).

Participants first indicated their agreement with five statements measuring driving expertise (randomized order, α = .82). Two items (“I can shift gears easily according to the driving conditions,” “I can use the clutch easily while changing gears,” r = .79, p < .001)
measured expertise in operating manual transmission, and their average was separately used as an additional measure of expertise. The other three statements investigated participants’ expertise with other aspects of driving (see Web Appendix B). Participants then rated outcome quality on the dimensions of reliability, likelihood of breaking down, and performance (bipolar scales, 1 = Manual transmission, 7 = Automatic transmission, see Web Appendix B). The reliability of an aggregate measure of the three outcomes items was barely acceptable ($\alpha = .68$). Below we report analyses conducted using both an aggregated outcome scale and the three items separately. Finally, participants reported how many cars they owned and were asked to focus on their preferred car. For this car, participants reported age, brand, and, critically, type of transmission (automatic vs. manual).

Results and Discussion

The majority of participants (77%) owned a car with automatic transmission. We conducted a logistic regression using type of transmission as dependent variable and strength of identification as independent variable. Consistent with our prediction, participants who identified more strongly as car drivers were more likely to own a car with manual transmission ($b = .29$, $Wald = 4.93$, $p = .026$). Not surprisingly, when we included manual transmission expertise and the three perceived outcome quality items as covariates, we found that participants who perceived manual transmission to be less likely to break down and to perform better under most situations were more likely to own a car with a manual transmission ($b_{break\ down} = -.33$, $Wald = 4.66$, $p = .031$; $b_{performance} = -.44$, $Wald = 6.39$, $p = .011$). Manual transmission expertise did not predict choice ($p > .12$). More importantly, stronger identification as a driver still predicted likelihood to own a car with manual transmission after controlling for expertise and perceived outcome quality ($b = .29$, $Wald = 4.04$, $p = .044$). We found similar results controlling for general driving expertise instead of manual transmission expertise (for identification: $b = .28$, $Wald = 3.86$, $p = .049$), and
controlling for the aggregated perceived outcome scale instead of the three perceived outcome quality items separately \((b = .31, \text{ Wald } = 4.75, p = .029)\). In addition, we found that strength of identification did not significantly correlate with any of the expertise or outcome quality items \((ps > .24)\). Importantly, strength of identification remained a significant predictor of transmission choice even after controlling for a host of other factors (whether the car was a luxury car, manufacturer’s origin, age, and gender, see Web Appendix C).

In sum, Study 1 documents an association between strength of identity as a car driver and likelihood of owning a car with manual transmission. Cars are the most expensive product owned by most people, and it is a category where automation is likely to increase vastly in the coming years. The study employed a two-phase design that avoided study imposters by disguising the study eligibility criteria (Chandler and Paolacci 2017), and separated the measurement of the independent and dependent variable by between two and six months. We collected measures to rule out that strong identifiers dislike automation simply because they have higher expertise or because they perceive the outcomes of automatic transmission to be inferior. We measured these alternative processes immediately prior to measuring the dependent variable, whereas our key independent variable was measured several months earlier. The robustness of the effect of strength of identification on transmission choice is thus remarkable.

**STUDY 2: BIKING**

Study 2 documents the link between strength of identification and preferences for automation using an experimental approach that manipulates identity salience. In this study, we focus on a different consumption domain—cycling.

*Method*
Three hundred and thirty-eight Dutch students (183 females; $M_{age} = 19.8$, $SD = 1.35$) at a major Dutch university participated in this lab study in exchange for course credit. Following previous research, we manipulated identity salience using essay writing tasks, an approach that has been successfully used to increase the accessibility of stable and important identities (e.g., gender identity among women, Puntoni, Sweldens, and Tavassoli 2011). We manipulated strength of identification by randomly assigning participants to either write about the role of biking in their life (identity salient condition) or about the role of a biking-irrelevant factor (control condition). We selected biking as the study context because it is an activity that virtually all Dutch university students perform regularly (daily, in most cases) but that can be performed for different reasons and with different levels of involvement. For some students, biking is just a cheap and efficient way to go from one place to another, whereas for others it is a hobby. In the identity salient condition, participants were asked to spend 5 minutes reflecting on what the Dutch biking culture meant for them. In the control condition, participants read the same instructions but now they were asked to focus on another stereotypical Dutch passion: flowers. Next, participants were asked to read a bike purchase scenario. In the scenario, participants came across a bike advertisement in a bike shop and decided to buy that bike. Then participants learned about a special offer that would allow them to have an automated feature (a rechargeable battery that assists pedaling) installed on their bike without extra charges. Participants were asked whether they would like to add this (free) feature on their bike. To control for biking experience, participants were then asked whether they knew how to ride a bike, how often they rode a bike, and for how long they had been riding a bike.

Results and Discussion

Two participants did not know how to ride a bike and were excluded from the analysis. The majority of the participants used a bike every day (62%) and had been biking
for more than ten years (98%). Participants in the two conditions did not differ in terms of frequency of bike use ($p = .26$) or years of experience in biking ($p = .69$). In total, 72% of the participants chose to have the free automated feature. However, 78% of the participants in the control condition chose to have the free automated feature while only 66% of the participants in the identity salient condition did ($\chi^2 = 5.79, p = .016$).

These results thus replicate the previous findings with an experimental approach, ensuring that identification does not correlate with confounding variables such as expertise and experience with biking. Study 2 also helps addressing the alternative explanation that identifiers simply enjoy performing the focal task more. In this case, the focal task (pedaling) needs to be performed even in the presence of automation (albeit with less effort for the same speed or to reach a faster speed with the same effort), and people do not need to use assisted pedaling if they chose not to.

To further explore the generalizability of these findings, we replicated the results using a correlational study (reported in the Web Appendix F) where, instead of priming biking identity, we measured identification with a self-report measure similar to the one used in Study 1. We found again a negative association between strength of identification and willingness to accept the free battery back ($N = 120; r = -.20, p = .027$).

**STUDY 3: BAKING**

We argue that strong identifiers resist automating tasks because doing so prevents internal attribution of consumption outcomes, ultimately frustrating identity goals. This implies that strong identifiers should resist automation that replaces skills that are central to the identity, but not automation that does not. Study 3 test this prediction, and provides first evidence for the role of internal attribution.
We employed a baking scenario in which participants could borrow equipment to make bread, and test whether strength of identification predicts preference for automation differently depending on how much skill the automated task would require if performed by the user. In particular, we expect identifiers to resist automation that drastically reduces the skills required to bake the bread (i.e., a bread-baking machine), but not automation that does not (i.e., a machine that only mixes the dough, something that virtually anybody can do). We expect participants to evaluate the two products as differently preventative of internal attribution of consumption outcomes; and strength of identification to moderate the degree to which the possibility for internal attribution predicts willingness to borrow the equipment. Accordingly, lower internal attribution should lead to lower likelihood to borrow among strong identifiers more than among weak identifiers. Statistically, therefore, we used product as independent variable and identity strength as moderator (and tested a moderated mediation model with prevention of internal attribution as mediator).

We pretested the differential amount of skills involved in bread-baking and dough-mixing with 101 US residents recruited on MTurk (57 females, M\text{age} = 33.1, SD = 9.33). Participants read the descriptions of bread-baking and dough mixing (on separate pages and in random order): Participants rated the amount of skill involved in each task on a 7-point scale (1 = No skill is involved, 7 = A great deal of skill is involved). A paired-samples t-test revealed that bread-baking was perceived as requiring more skills than dough-mixing (M\text{bread-baking} = 5.06, SD = 1.24, M\text{dough-mixing} = 4.44, SD = 1.45; t(100) = -3.55, p < .001).

**Method**

Four hundred and six US residents recruited on MTurk (161 females, M\text{age} = 32.7, SD = 10.02) were randomly assigned to one condition of a 2 (strength of identification: strong identification vs. control) x 2 (automated task: more vs. less-skill-required) between-participants design. We manipulated strength of identification by prompting half of
participants with identification information. In the strong identification conditions, participants read: “Imagine you are a keen amateur bread baker. Although your skills are far from professional, you are very serious about baking. You are proud of yourself as a bread baker. You spend most of your free time baking and you enjoy baking.” Participants in the control conditions did not read this description. All participants read: “Today you are planning to make a loaf of bread. Suppose you do not have all the equipment needed for the baking task. You can get some equipment from a friend living next door.”

Participants then read the description of one of two products. In the more-skill-required conditions, participants read: “Jones Bread-Maker bakes the bread for you. There is a display screen showing you which ingredients you need, their corresponding amount, and the order to put the ingredients into the bread-maker. You just need to put your ingredients into the bread-maker. Once you press the “start” button, a loaf of bread will be ready soon.” In the less-skill-required conditions, participants read: “Jones Dough-Mixer kneads the dough for you. This dough-mixer has various timers and controls. You can just put the ingredients into the dough-mixer according to your recipe. Once you press the “start” button, the dough will be ready soon.” Participants indicated their willingness to borrow the equipment (-3 = definitely will not borrow; 0 = indifferent; +3 = definitely will borrow). We used borrowing as a context to avoid potential confounds of irrelevant purchase considerations. We also measured the extent to which the product prevents internal attribution (agreement with the statement that by using the product “I cannot claim that the bread was well-made because of my baking ability” on a 7-point scale).

Results and Discussion

A 2 x 2 ANOVA with willingness to borrow (WTB) as dependent variable revealed a main effect of strength of identification (WTB was lower in the strong identification condition, F(1, 402) = 19.52, p < .001), a main effect of automated task (WTB was lower in
the less skill required condition, \( F(1, 402) = 3.76, p = .053 \), and, more importantly, a significant interaction (\( F(1, 402) = 11.91, p = .001 \); see Figure 1). Consistent with our hypotheses, when the automated task required more skill to be performed manually (i.e., bread-baking), WTB was lower in the strong identification condition than in the control condition (\( M_{\text{strong}} = .12, \text{SD} = 2.00 \) vs. \( M_{\text{control}} = 1.52, \text{SD} = 1.61 \); \( F(1, 402) = 30.96, p < .001 \)). However, when the automated task required less skill (i.e., dough-mixing), WTB did not differ between strong identifiers and control participants (\( M_{\text{strong}} = 1.08, \text{SD} = 1.83 \) vs. \( M_{\text{control}} = 1.25, \text{SD} = 1.71 \); \( F(1, 402) = .47, p = .50 \)). In addition, the dough-mixer allowed higher potential for internal attribution than the bread-maker (\( M_{\text{dough-mixer}} = 5.13, \text{SD} = 1.68 \) vs. \( M_{\text{bread-maker}} = 3.69, \text{SD} = 1.84 \); \( t(404) = 8.22, p < .001 \)). We also conducted a 2 x 2 ANOVA on internal attribution. There were main effects of identity (\( F(1, 402) = 6.14, p = .014 \)) and product (\( F(1, 402) = 68.40, p < .001 \)) but no interaction (\( p = .77 \)).

--- INSERT FIGURE 1 and 2 HERE ---

We proposed that products that automate tasks that require more vs. less skill to be performed manually are differently preventative of internal attribution, which selectively impacts WTB among strong identifiers. Statistically, we tested this prediction by conducting a moderated mediation analysis using 5,000 bootstrapped samples (Hayes 2012; PROCESS model 14) with automated task as the independent variable, internal attribution as mediator, strength of identification as moderator, and WTB as dependent variable. The model was significant (\( b = -.46, \text{SE} = .15, 95\% \text{CI}: -0.76 \text{ to } -0.19 \); see Figure 2). Participants considered the bread-maker as more preventative of internal attribution than the dough-mixer (\( b = 1.44, \text{SE} = .17, 95\% \text{CI}: 1.09 \text{ to } 1.78 \)), which decreased WTB (\( b = -.14, \text{SE} = .067, 95\% \text{CI}: -0.28 \text{ to } -0.00 \)). Internal attribution decreased WTB among participants in the strong identity condition (\( b = -.66, \text{SE} = .12, 95\% \text{CI}: -0.91 \text{ to } -0.45 \)), but not among participants in the control condition (95% CI included 0: -0.43 to 0.02).
These results replicate the finding that greater strength of identification leads to decreased acceptance of automation in identity-relevant contexts. Study 3 adds to the previous studies by showing that this effect does not hold when the automated task requires less skill because this type of automation does not prevent internal attribution of consumption outcomes. We replicated these results in a modified version of this study that controls for inferred expertise and perceived quality of outcomes (see Web Appendix J).

**STUDY 4: FISHING**

In this experiment we use a simple design and estimate the contribution of internal attribution to the effect of identification on preferences for automation while controlling for the potential concurrent mediating role of alternative variables: expertise, enjoyment, and outcome quality. Participants might believe that identifiers are experts who do not need automation, that automation would provide a less enjoyable experience, or that it would lead to inferior outcomes. These beliefs might contribute to identifiers’ resistance to automation, but we hypothesize the remaining mediating effect of internal attribution to be significant.

We conducted the study in a fishing context in which automation is conducive to superior outcomes. In previous studies, we ruled out (either by design or statistically) the possibility that the effect is caused by strong identifiers’ lack of trust in automation’s ability to do the job as well as they can. In this study, we focus on an automated feature that could yield superior outcomes – a fishing rod with an automatic hook setting device. The automatic hook setting allows catching fish while the rod is unmanned. Therefore, this automated feature enables users to potentially catch more fish. Besides, to isolate the effect of internal attribution, we included measures of expertise, perceived process enjoyment, and perceived outcome quantity.
Method

Three-hundred and five US residents on MTurk (137 females, Mage = 34.2, SD = 10.61) were randomly assigned to either an identity condition or a control condition. In the identity condition, the scenario started with: “Imagine you used to go fishing with your father during your childhood. You were not particularly skilled. Although you might not have gone fishing in a long time, you still consider yourself a recreational fisherman. Fishing is an important part of who you are even though you are still not particularly good at it.” Participants in the control condition read only the first two sentences. Next, all participants read: “Today you are visiting a friend who lives in another city. Your friend suggests going fishing. You can borrow one of the following fishing rods from a fishing store next door: Jones fishing rod is made of fine materials. It is sensitive, making it easy to feel slight movements. Its three-part cork handle allows for a firm grip and great control; and Smith fishing rod is made of quality materials. It comes with an automatic fishing hook setting device which attaches to the fishing rod. It automatically sets the fish hook when a fish takes the bait while the pole is unmanned.” Participants then chose between the normal rod and the one with the automated feature. After, they were asked to indicate their agreement on few 1-7 items measuring one’s need for internal attribution (α = .87): “It would be important for me to know that I catch fish because of my own fishing skills,” “It would be important for me to feel proud of the fish I was able to catch,” “It would be important for me to take credit for the fish I caught.” We also collected an identity manipulation check, (agreement with “I am really into fishing,” “I identify myself as a fisherman,” “Fishing is one of my favorite hobbies;” α = .92), a measure of inferred expertise (agreement with “I am good at fishing,” “I know how to fish well,” “I can fish well;” α = .94), a measure of outcome quality, i.e., how the two fishing rods contribute to catching more fish (“Which fishing rod can catch more fish?”; -3 = The Jones fishing rod can catch more fish, 0 = The number of fish caught is
probably similar between using the above two fishing rods, +3 = The Smith fishing rod can catch more fish), and a measure of perceived enjoyment of using the two fishing rods (“Which fishing rod would provide a more enjoyable experience?”; -3 = Jones fishing rod would provide a more enjoyable fishing experience, 0 = The two fishing rods would provide equally enjoyable fishing experience, 3 = Smith fishing rod would provide a much more enjoyable fishing experience).

Results and Discussion

Participants in the identity condition reported higher fishing identification (M_{strong} = 4.98, SD = 1.52 vs. M_{control} = 2.65, SD = 1.53, t(303) = 13.35, p < .001). Crucially, and replicating the findings of the previous studies, 61% of participants chose the automated fishing rod in the control condition and only 45% in the identity condition, a significant difference (χ² (1) = 7.84, p = .005). Moreover, need for internal attribution was higher in the identity condition than in the control condition (M_{strong} = 5.12, SD = 1.43 vs. M_{control} = 4.55, SD = 1.69, t(303) = 3.16, p = .002). In addition, those in the identity condition reported higher expertise (M_{strong} = 3.56, SD = 1.55 vs. M_{control} = 2.42, SD = 1.54, t(303) = 6.43, p < .001) and perceived the automated rod to provide a marginally less enjoyable experience (M_{strong} = -0.66, SD = 1.84 vs. M_{control} = -0.24, SD = 1.97, t(303) = -1.93, p = .054). There were no differences in perceived performance between conditions (p = .26). The automated rod was generally perceived to allow catching more fish than the non-automated option (M = 1.20, SD = 1.38, one-sample t(304) = 15.18, p < .001).

To test if desire for internal attribution mediated the effect of identification on automation choice controlling for the potential role of other mechanisms, we conducted a parallel mediation analysis with 5,000 bootstrapping samples (Hayes 2012) with desire for internal attribution, expertise, perceived enjoyment of automation, and outcome quality as competing mediators. Expertise (b = -.13, SE = .13, 95% CI: -.42 to .12), enjoyment (b =
-32, SE = .18, 95% CI: -.72 to .02), and outcome quantity (b = -.11, SE = .11, 95% CI: -.37 to .08) did not mediate the effect of identification on choice. Most importantly, participants’ desire for internal attribution did (b = -.30, SE = .13, 95% CI: -.60 to -.10).

In sum, this study replicates the findings of the previous studies and adds to the evidence for the role of internal attribution by using a parallel mediation approach. Notably, participants perceived the automated fishing rod to catch more fish than the non-automated option, implying that resistance to automation does not depend on inferences that automated options are performing worse than non-automated options.

**STUDY 5: BIKING MOTIVES**

The previous studies focus on how the choices of weak and strong identifiers differ, and thus do not explore the potential role of situational variability in the motivations of high identifiers. However, as highlighted in our theory section, strong identifiers may sometimes consume for non-identity reasons and, when they do so, they should display less resistance to automation. Study 5 examines this possibility using a bike purchase scenario that manipulates the motive for buying a bike.

**Method**

Two hundred US residents on MTurk (99 females, M_{age} = 33.0, SD = 11.69) were randomly assigned to either an identity motive or a non-identity motive condition in a between-participants design. All participants first read the following: “Imagine you are a keen bike rider. Although your skills are far from professional, you are very serious about biking. You are proud of yourself as a bike rider. You spend most of your free time biking and you enjoy biking. You often visit a bicycle forum to exchange information on different types of bicycles with other members on the forum.” Participants in the identity motive
condition then read the following: “Lately you are considering buying a new bicycle for weekend excursions. These excursions feature a few different courses of approximately 10 miles. During these activities, you can enjoy the cycling activities and enhance your skills as a cyclist. You want to minimize your cycling time that is not part of the excursion (e.g., getting to the start).” In the non-identity motive condition, participants instead read: “Lately you are considering buying a new bicycle for commuting to work. The distance between your office and your apartment is approximately 10 miles. You live in a city with congested traffic and riding a bicycle would save you a lot of time to get to the office. You want to minimize the time of the ride to facilitate your commute.” Then participants read the same bike purchase scenario as in Study 2 and indicated whether they would like to have the free automated feature on their bike. We predicted that participants in the identity-motive condition would be less likely to choose to have the free automated feature compared to those in the non-identity motive condition.

Results and Discussion

Participants were more likely to want the free automated feature in the non-identity motive condition than in the identity motive condition, (80% vs. 57%; $\chi^2 (1) = 12.94, p < .001$). These results are consistent with our prediction that strong identifiers are less likely to prefer automation when the primary motive of consumption relates to identity than when it does not. Moreover, how intrinsically enjoyable a given task is should generally not change much across situations, and these findings thus join Studies 2 and 4 in suggesting that greater task enjoyment among high identifiers is not necessary for our key effect to occur.

STUDY 6: COOKING
Study 6 aims at showing that strong identifiers’ resistance to automation is contingent on products being framed as replacers of skills. If need for internal attribution drives the documented effect of identification on preferences for automation, automation should be perceived more negatively by strong versus weak identifiers when framed as replacing the user’s skills. When automation is framed as allowing users to deploy their skills, strong identifiers should perceive automation less negatively. Participants in this lab study were shown an advertisement for kitchen equipment, and were asked to evaluate its attractiveness. We manipulated whether the automated product was framed as skill-replacing (i.e., performing actions the user would otherwise perform) or skill-allowing (i.e., allowing users to put their skills to use) and hypothesized that only skill-replacing automation would be perceived as less attractive by strong identifiers relative to a baseline condition where the product involves no automation. We pretested the degree to which the products in the main study were perceived to substitute and to complement the user’s skills (N = 99 participants sampled from the same pool as the main study, 47 females, M_age = 19.8, SD = 1.56). The pretest confirmed the validity of the manipulation. See Web Appendix N for details.

**Method**

Four hundred and two business students participated in this lab study in exchange for course credit (203 females, M_age = 19.8, SD = 1.59). Participants were shown an advertisement for a cooking product and asked to evaluate its attractiveness. In a between-participants design, we manipulated whether the product was a non-automated cooking set, an automated cooking machine framed as replacing the user’s skills, or an automated cooking machine framed as allowing the user to deploy her skills.

In the no automation (baseline) condition, participants read the following description of a cooking set: “Smith Cooking Set is a complete cooking set that includes covered casserole, sauce pan, fry pan, 10-piece knife set, 5-piece nylon tools, a rolling pin, a balance
and a thermometer. With this set, you can perform different cooking tasks including weighing, kneading, blending, steaming, cooking, beating, precise heating and stirring. You can make sauce, soup, salad, pasta, pizza to cake or sorbet. Cooking has never been easier and more satisfying.”

In the two automation conditions, participants read the following description of a cooking machine: “Smith Automatic Cooking Machine combines nine appliances in one with functions that include weighing, kneading, blending, steaming, cooking, beating, precise heating and stirring.” In the skill-replacing automation condition, the text continued as “You can follow onscreen recipe instructions from sauce, soup, salad, pasta, pizza to cake or sorbet for a step by step guaranteed success. The recipes have been tailor made to work perfectly with the appliance - all you need to do is add the ingredients, and Smith Automatic Cooking Machine will set the temperature and timings for you. The entire cooking process is completed for you at the touch of a button. Cooking has never been easier and more satisfying.” In the skill-allowing automation condition, the text instead continued as “Apart from following the in-built recipes from sauce, soup, salad, pasta, pizza to cake or sorbet, you can recreate your own family favorites to create culinary masterpieces. You have complete control over your food and your recipes. You can manually select your time, temperature and speed. The entire cooking process is accomplished by you with the guidance of the machine. Cooking has never been easier and more satisfying.”

Participants indicated how much they liked the product on three items (1 = Dislike a great deal/Extremely negative/Extremely unfavorable, 7 = Like a great deal/Extremely positive/Extremely favorable; α = .92). We then measured participants’ strength of identification: “I consider myself an amateur chef,” “To me, cooking is an important part of my life,” “Cooking defines a central part of who I am.” (1 = Strongly disagree, 7 = Strongly agree). In contrast with the identification scales used in previous studies, reliability was low.
(α = .56). Reliability greatly improved by dropping the first item (α = .86; we conjectured that some participants interpreted the word “amateur” in the depreciative sense of being inept).

We thus aggregated the second and the third item as the cooking identity measure.

Results and Discussion

We estimated a regression model with the three conditions (baseline, skill-replacing automation, skill-allowing automation condition) and the mean-centered continuous measure of cooking identification as predictors. The baseline condition served as the reference category. The dependent variable was product liking. There was a main effect of identification on liking (b = .18, t(396) = 2.69, p = .007). There was also a marginal simple main effect of condition (comparing skill-replacing automation and baseline conditions) whereby skill-replacing automation lead to a general lower liking of product (b = -.25, t(396) = -1.67, p = .097). There was no main effect of condition when comparing skill-allowing automation and baseline conditions (p = .74). More importantly, the interactions between identification and skill-replacing automation (b = -.51, t(396) = -5.33, p < .001) and between identification and skill-allowing automation (b = -.23, t(396) = -2.50, p = .013) were significant.

Illustrating our main hypothesis, whereas stronger identification corresponded to higher liking in the no automation condition (b = .18, t(133) = 3.14, p < .01), it corresponded to lower liking in the skill-replacing condition (b = -.33, t(131) = -4.34, p < .001).

Importantly, in line with our predictions, the negative association between strength of identification and liking was not observed in the skill-allowing automation (b = .06, t(132) = -.86, p = .39). In other words, automation leads to lower liking among strong identifiers only when it is presented as replacing the user’s skills. Further regression analyses and floodlight analyses were conducted to contrast the effect of identity on product liking across conditions.
No automation vs. Skill-replacing automation. There was a significant interaction between identity strength and condition (b = -.51, t(264) = -5.39, p < .001). We conducted a floodlight analysis to see at which level of cooking identity (M = 3.61; SD = 1.59) the interaction became significant. Participants whose cooking identity was 2.40 or less liked the skill-replacing automated product more than the non-automated product (b = .36, SE = .18). On the contrary, participants whose cooking identity was 3.69 or more liked the non-automated product more than the skill-replacing automated product (b = -.29, SE = .15).

No automation vs. Skill-allowing automation. There was a significant interaction between identity strength and condition (b = -.12, t(265) = -2.66, p = .008). A floodlight analysis showed that participants whose cooking identity was 1.28 or below liked the skill-allowing automated product more than the non-automated product (b = .49, SE = .25). On the other hand, participants whose cooking identity was 4.91 or more liked the non-automated product more than the automated product (b = -.35, SE = .18). However, this effect is weaker than the previous contrast in which a non-automated product is compared against a skill-replacing automated product.

Skill-replacing automation vs. Skill-allowing automation. Crucially, there was a significant interaction between identity strength and condition (b = .27, t(263) = 2.65, p = .008). A floodlight analysis showed that participants whose cooking identity was 4.08 or more liked the skill-allowing automation more than the skill-replacing automation (b = .33, SE = .17). This suggests that the effect that strong identifiers dislike automation is mitigated when the automation is skill-allowing rather than skill-replacing (see Figure 3).

In sum, Study 6 shows that consumers who strongly identify as cooks are less attracted to automated kitchen equipment when this is framed as replacing relevant cooking skills. However, by advertising automated products as compatible with people expressing
their cooking skills, marketers can counteract the detrimental effects of automation among strong identifiers.

**GENERAL DISCUSSION**

Automation in consumer products is one of the most visible manifestations of how technology is changing people’s lives. Despite the importance and increasing prevalence of automated products in the marketplace, academic research has so far offered limited insight into the consequences of this trend for consumers and marketers. The current studies start filling this gap. Automation provides great efficiency gains, making consumption more convenient and allowing consumers to more easily enjoy the outcomes of consumption. However, our work suggests that automation may not be universally desirable, and in particular that automated products can be unattractive when identity motives are an important driver of consumption. In a series of studies, we demonstrated that consumers who strongly identify with a social category tend to resist automation in identity-relevant products. When consumption requires performing non-trivial actions (i.e., involving skills and/or effort), automating such performance prevents consumers from attributing consumption outcomes to their own skills, ultimately depriving identity-driven consumers of the self-signaling utility of consumption. Highlighting the managerial relevance and robustness of the findings, the studies span a variety of activities and automated features or products: driving (automatic transmission, Study 1), biking (a battery pack to assist pedaling, Study 2 and 5), baking (bread-baking machine, Study 3), fishing (automatic hook setting, Study 4), cooking (multi-purpose cooking machine, Study 6). The data package is available via [https://osf.io/xk7zt/](https://osf.io/xk7zt/).

*Theoretical Implications*
For decades, economists and sociologists have studied how automation affects employment and workers’ wellbeing. We take a different perspective and, instead of examining the supply-side effects of automation, we examine its demand-side implications. Our work focuses on consumers, and on the differential attractiveness of automated products across different types of consumers and consumption situations. Specifically, our work implies that automation may increase the outcome utility of a product but decrease its self-signaling utility (Bodner and Prelec 2003), which is particularly relevant for identity-motivated consumers. Intriguingly, this proposition echoes the Marxist view of automation in production, which sees automation as alienating because it deprives workers of the self-rewarding features of their work (Blauner 1964; Braverman 1998). Our results also join a research stream in marketing that conceptualizes technological progress as a trend that, together with great and obvious advantages, brings also challenges for consumers (Mick and Fournier 1998). In a study by Etkin (2016), for instance, participants wearing a pedometer walked more during a day but reported less enjoyment with walking than participants who did not wear a pedometer. Our work also answers calls to explore how technology may affect people differently depending on consumption motives (Reed et al. 2012).

Beyond the context of technology, we contribute new theorizing on consumer identity. Identity-based consumer behavior is one of the most important areas of inquiry for consumer researchers, and decades of work have led to the accumulation of a vast and rich body of knowledge. The crux of this literature is that product choice and product use enable consumers to express who they are, and the groups they belong to (Belk 1988; Oyserman 2009a; Reed et al. 2012). For instance, consumers strategically choose products that others have not chosen in order to signal their identity (Berger and Heath 2007). However, identities affect not only product acquisition and display, but also how consumers engage with products. We take an action-oriented perspective (Oyserman 2009b) and highlight how
identity-based consumption relies on consumers being able to attribute consumption outcomes to their skills. Despite the advantages of automation, strong identifiers often resist products that automate skills central to their identity, because that is tantamount to cheating.

Managerial Implications

Across product domains, companies are investing large sums to create innovations that make consumers’ life easier. Our results do not question the marketplace value of automation, but warn managers against thinking of automation as universally desirable. The results have thus important implications for a range of marketing decisions.

Targeting. In many product categories, strong identifiers are often highly involved consumers who are prime targets for a company’s most innovative (and expensive) products. Our findings highlight the risks involved in targeting strong identifiers with product innovations that involve automation of identity-relevant tasks. Innovations that prevent internal attribution of consumption outcomes risk being least appealing to a firm’s most attractive customers, potentially explaining the low adoption rates of some innovative products among strong identifiers. Examples abound and include cooking machines among amateur cooks and knitting machines among knitting enthusiasts.

Product Innovation. In addition to pointing to a potential reason for disappointing sales among strong identifiers, the studies also offer suggestions for how to best direct a company’s innovation efforts. The findings suggest that it is crucial to include an assessment of identity relevance when investigating which of the tasks that are currently performed by consumers could be good candidates for greater automation. We are not aware of any company currently doing this systematically.

Communication. The results also show that how innovations are marketed deserve careful attention. Automated products such as cooking machines are not always preferable to their non-automated counterparts. For example, there are cooking machines in the market that
explicitly target cooking enthusiasts and stress how cooking would become for them a matter of “touching a button.” Our results show that many potential customers value expressing their skills, and imply that marketers should not deprive consumers of the feeling that they are the ones producing the final outcome. In particular, Study 6 suggests that convenience is often less of a selling point for strong identifiers than for the average customer. Marketers should take people’s motives into account, and communicate the benefits of automation in a way that matches their target’s goals.

*Future Research*

Like most phenomena of broad practical relevance, the effect of identity on preference for automation is in practice likely to be multiply determined, and it would be interesting to assess the prevalence of other theoretical mechanisms. Because our theorizing zooms in on the role of internal attribution, our studies focus on documenting and isolating the role of this factor, while minimizing the impact of other possible factors. One potential mechanism which we have not discussed so far is a desire among high identifiers to learn skills by practicing tasks, however, some of the products we used do not prevent high identifier from practicing tasks. The bike battery pack in Studies 2 and 5 does not prevent people from exerting effort and practicing their cycling skills, while the fishing rod with the automatic fishing hook in Study 4 still enables fishermen to learn because the automated feature is simply an added bonus to a normal fishing rod that operates when the rod is unmanned. Nonetheless, future research should expand the nomological network proposed in this paper to examine other potential mediating processes.

The distaste for automation among strong identifiers is reminiscent of other situations in which people choose to forgo convenience. In a classic textbook example, when General Mills launched Betty Crocker’s instant cake mixes in the 1950s, sales initially disappointed. Sales improved when the product was made less convenient by requiring the addition of an
egg. Even though there are multiple explanations for why this strategy succeeded (e.g., cakes might be perceived as tastier or nutritionally richer with the addition of an egg), our results suggest that the difficulty for users to credit themselves for the cake likely played a major role. To examine whether resistance to convenience extends beyond automation, we conducted a study using an actual coloring task (see Web Appendix Q). We found that strong identifiers might dislike convenience that takes other forms than automation because of a similar internal attribution mechanism. Future research should explore whether strategies to counteract the distaste for automation among strong identifiers might be applicable to cases in which tasks are outsourced to external agents. Additionally, our results demonstrate that identifiers resist automation even when their choices are inconsequential or anonymous. Although this suggests that resistance to automation occurs even when choices are private, it might be amplified when choices are observable. Future research should explore additional contextual determinants of how identity impacts preference for automation.

Methodologically, in our work we used several procedures to ensure variation in strength of identification, each with strengths and weaknesses. Measures of chronic strength of identification (as in Studies 1 and 6) directly capture the extent to which different participants are identified with a product category, but require controlling for correlated constructs (e.g., expertise) that might also affect preference for automation. Scenario procedures (Studies 3, 4 and 5) allow for random assignment to conditions that only differ in imagined identification, and facilitate designing stimuli that rule out alternative explanations to the key hypotheses. However, in this context as well as in others, scenarios suffer from known limitations that should not be downplayed (e.g., scenarios may tap into lay theories about behavior rather than actual behavior), and evidence from such studies does not reduce the need for more ecologically valid methods. Combining the advantages of these opposite approaches, the essay-writing manipulation that we used in Study 2 is modeled after priming
procedures (e.g., Puntoni et al. 2011) that attempt to activate existing identity-related knowledge structures through situational cues. Such manipulations allow for causal inferences about the population of interest, but might be impractical to administer in certain studies, and populations where the relevant latent identities are prevalent might be hard to reach. The approach in the present paper has been to triangulate the findings obtained with different methods and across different contexts (different product categories, stimuli, dependent variables, participant populations), but future research would benefit from improved solutions to the methodological tradeoffs that characterize current research into the effects of strength of identification.

The ever-increasing range of tasks that machines can perform on our behalf is a marker of technological development—one could even argue that automation *defines* progress, like washing machines did in the past and autonomous cars will in the near future. The recent explosion in the power of computing and artificial intelligence will lead to the appearance of increasingly “skillful” products capable of autonomous decision-making and action. A fuller appreciation of how automation impacts consumers’ relationship with products is thus a crucial step towards understanding how technology is likely to reshape consumption in the years ahead.
REFERENCES


TABLE 1: STUDY RESULTS

<table>
<thead>
<tr>
<th>Study</th>
<th>Context</th>
<th>Participants</th>
<th>Key variables</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Driving</td>
<td>Phase 1: N = 2444 (1,119 F, M&lt;sub&gt;age&lt;/sub&gt; = 31.0, US, Prolific)</td>
<td>IV: Strength of identification (driving)</td>
<td>b = .29</td>
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<tr>
<td></td>
<td></td>
<td>Phase 2: N = 150 (55 F, M&lt;sub&gt;age&lt;/sub&gt; = 40.13)</td>
<td>DV: Transmission type of the car owned</td>
<td>Main finding: Strong identifiers are more likely to own a car with manual transmission.</td>
</tr>
<tr>
<td>2</td>
<td>Biking</td>
<td>N = 338 (183 F; M&lt;sub&gt;age&lt;/sub&gt; = 19.8, undergraduates)</td>
<td>IV: Identity salience</td>
<td>Identity salient</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>DV: Choice of free automated feature</td>
<td>66%</td>
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<tr>
<td></td>
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<td></td>
<td>Main finding: Participants in the identity salient condition are less likely to accept the offer of a free automated feature than those in the control condition.</td>
</tr>
<tr>
<td>3</td>
<td>Baking</td>
<td>N = 403 (173 F, M&lt;sub&gt;age&lt;/sub&gt; = 33.0, US, MTurk)</td>
<td>IV: Level of skill required of the automated task</td>
<td>More skill required</td>
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<td></td>
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<td>Moderator: Strength of identification Mediator: Internal attribution</td>
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<td></td>
<td></td>
<td></td>
<td>DV: Willingness to borrow the automated machine</td>
<td>Strong id</td>
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<td>.12</td>
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<td></td>
<td>Main findings: Greater strength of identification leads to decreased acceptance of automation in identity-relevant contexts, but not when the automated task requires less skill.</td>
</tr>
<tr>
<td></td>
<td>Activity</td>
<td>N =</td>
<td>Age</td>
<td>Gender</td>
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<td>4</td>
<td>Fishing</td>
<td>305</td>
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<td>137 F, US, MTurk</td>
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<td>5</td>
<td>Biking</td>
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<td>214 F, US, MTurk</td>
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<td>203 F, undergraduates</td>
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*indicates the standard deviation
STUDY 3: IDENTIFICATION ON WILLINGNESS TO BORROW AUTOMATED PRODUCTS

Figure 1

- Strong identification
- Control

Willingness to borrow

STUDY 3: MODERATED MEDIATION

Moderated Mediation Results based 5,000 bootstrapped samples (95% CI: -0.76 to -0.19)

Note: ***p < .001
STUDY 6: PRODUCT LIKING BY SKILL-REPLACING AND SKILL-ALLOWING AUTOMATION CONDITION

FIGURE 3

Product liking vs Identification

- Skill-allowing automation
- Skill-replacing automation
- Baseline (no automation)
Web Appendix

Man versus Machine: Resisting Automation in Identity-Based Consumer Behavior

Web Appendix A: Questions of the Screening Survey (Study 1)

1. How much do you agree with the following statements? (1 = Not at all, 7 = Very much)
   - I am really into driving.
   - I identify myself as a driver.
   - Driving is one of my favorite hobbies.

2. Do you have a driving license? (Yes, No)

3. Do you know how to drive a car with manual transmission? (Yes, No)

4. Do you own any car(s)? (Yes, No)

For the following questions, please consider the car that you prefer to use.

1. Was the car second-handed when you bought it? (Yes, No)

2. Why did you choose the car? Choose all that apply.
   - I preferred the car.
   - Someone else (e.g. a household member) preferred the car.
Web Appendix B: Questions of the Main Study (Study 1)

Driving Expertise Measures
How much do you agree with the following statements about your driving expertise? (1 = Not at all, 7 = Very much)

- I can shift gears easily according to the driving conditions.
- I can use the clutch easily while changing gears.
- I can center my vehicle within the lane markings when driving on expressway.
- I can keep my vehicle centered within my lane without weaving outside of the lane markings.
- I can keep pace with the surrounding traffic without much effort.

Outcome Measures
Transmission can be automatic or manual. Please rate your opinions on automatic transmission and manual transmission in terms of the following factors:

(1 = Manual transmission is a lot more reliable/is a lot less likely to break down/works a lot better than automatic transmission,
4 = These two types of transmissions are equally reliable/are equally likely to break down/work equally well under most situations,
7 = Automatic transmission is a lot more reliable/is a lot less likely to break down/works a lot better than manual transmission)

- Reliability
- Likelihood to break down
- Performance under most situations
Questions Regarding the Car

For all the remaining questions, please consider only the car that you prefer to use.

- How old is the car?
- What is the brand of the car?
- What is the model of the car?
- What is the transmission of the car? (Automatic, Manual)
Web Appendix C: Robustness Check (Study 1)

Participants’ strength of identification as a driver might covary with other car features, potentially explaining at least part of the correlation between strength of identification and choice of manual transmission. In particular, luxury car brands and European car manufacturers are more likely to produce cars with manual transmission (Statistica 2016). We thus classified the brands owned by participants as luxury (Audi, BMW, Cadillac, Infiniti, Lexus, Mercedes, and Tesla) or non-luxury (Buick, Chevrolet, Chrysler, Daimler, Dodge, Ford, GM, Honda, Hyundai, Jeep, Kia, Lincoln, Mazda, Nissan, Pontiac, Ram, Scion, Toyota), and created dummies for the manufacturer’s origin (North America, Asia, or Europe). Participants’ age and gender also might correlate with preference for manual transmission, potentially contributing to the effect of identity on preference for manual transmission. For example, older participants should be more likely to have driven a car with manual transmission in their youth and it is possible that the importance of driving in consumers’ identity has declined over time. In a logistic regression controlling for manual transmission expertise, perceived outcome quality, brand luxury, origin, age, and gender, strength of identification remained a significant predictor of transmission choice (b = .32, \( \text{Wald} = 4.21, p = .040 \)). Perceived likelihood to breakdown, perceived performance under most situations, and expertise were also significant in this model (\( b_{\text{break down}} = -.36, \text{Wald} = 4.37, p = .036; b_{\text{performance}} = -.48, \text{Wald} = 6.22, p = .013; b_{\text{expertise}} = .45, \text{Wald} = 3.90, p = .048 \)). Apart from age (\( b = -.045, \text{Wald} = 4.26, p = .039 \)), none of the other control variables predicted transmission choice (\( p_s > .18 \)). Controlling for the aggregated perceived outcome index instead of the three outcome quality items yielded similar results (for identification: \( b = .32, \text{Wald} = 4.46, p = .035 \)).
Web Appendix D: Identity Salience Manipulation (Study 2)

Identity Salient Condition

The Dutch are in love with bicycles. The Netherlands is the number one cycling country in the world. It has the largest number of bike lanes, the best safety record, the largest number of frequent bike users, and has produced many cycling champions. Please take 5 minutes to reflect what this Dutch "biking fanatic" culture means to you.

Control Condition

The Dutch are in love with flowers. The Netherlands is the number one flower producer in the world. It has the largest flower market, the best quality flowers, the largest number of flower trading partners, and has contributed in the development of floricultural genetics. Please take 5 minutes to reflect what this Dutch “flower fanatic” culture means to you.
Web Appendix E: Bike Purchase Scenario (Study 2)

Now imagine you want to buy a bike. You have come across the following advertisement in a bike shop: Civian 2015 uses an advanced aluminum frame and gives you the light, smooth bicycle you would expect from the company’s top-notch craftsmanship. The Civian’s geometry is engineered for a swift, responsive ride. The quality materials ensure little maintenance.

When you are paying for the bike, the seller asks you whether you would like to get the ElectroPower engine on your bike for free. ElectroPower relies on an eco-friendly rechargeable battery and the latest technology to assist the rider’s pedal power.
Web Appendix F: Replication with Correlational Data (Study 2)

In this study, we measured participants’ strength of identification as bike riders, and test whether high identifiers are more likely to resist automation in a bike purchase scenario.

One hundred and twenty Dutch students (74 females; $M_{\text{age}} = 21.4$, $SD = 3.56$) at a Dutch university voluntarily participated in this study. They were stopped in the social areas of the university campus and invited to complete a paper-and-pencil questionnaire featuring a bike-purchasing scenario. Then participants read the same bike purchase scenario as in Study 2 and indicated whether they would like to have the free automated feature on their bike.

To assess strength of identification, participants were asked to report their agreement with three statements (highly correlated and thus combined, $\alpha = .88$): “I identify myself as a biker,” “I think of myself as someone who bikes,” “I like to be considered by others as a biker.” (1 = strongly disagree, 7 = strongly agree). In our description, we made it clear to participants that the word “biker” referred to biking on a bicycle.

As predicted, a significant point-biserial correlation coefficient ($r = -.20$, $p = .027$) revealed a negative relationship between identity centrality and wanting the free automated feature. The more central the biker identity was to the participants, the less likely they were to accept the free automated feature.
Appendix G: Pre-test Stimuli (Study 3)

*Description of Bread-baking*

“Dough-mixing consists of three tasks: rolling the dough so that it is flattened, mixing the dough until the ingredients (e.g., flour, yeast and water) are thoroughly mixed, and pressing the dough so that it reaches the right consistency.”

*Description of Dough-mixing*

“Bread-baking consists of three tasks: selecting the right ingredients for different types of bread, shaping the bread to the desired shape (e.g., baguette, ring-shaped or braided-shaped), and setting the optimal temperature and timing for the baking.”
Web Appendix H: Strength of Identification Manipulation (Study 3)

Strong Identification Condition

Imagine you are a keen amateur bread baker. Although your skills are far from professional, you are very serious about baking. You are proud of yourself as a bread baker. You spend most of your free time baking and you enjoy baking.

Today you are planning to make a loaf of bread. Suppose you do not have all the equipment needed for the baking task. You can get some equipment from a friend living next door.

Control Condition

Today you are planning to make a loaf of bread. Suppose you do not have all the equipment needed for the baking task. You can get some equipment from a friend living next door.
Web Appendix I: Automated Task Manipulation (Study 3)

*More-skill-required*

Jones Bread-Maker bakes the bread for you. There is a display screen showing you which ingredients you need, their corresponding amount, and the order to put the ingredients into the bread maker. You just need to put your ingredients into the bread maker. Once you press the “start” button, a loaf of bread will be ready soon.

*Less-skill-required*

Jones Dough-Mixer kneads the dough for you. This dough mixer has various timers and controls. You can just put the ingredients into the dough-mixer according to your recipe. Once you press the “start” button, the dough will be ready soon.
Web Appendix J: Replication Controlling for Expertise and Perceived Outcomes of Automation (Study 3)

In Study 3, we showed that strong identifiers only dislike automation when the task being automated is deemed to require more skill. In this study, we aimed to replicate our findings and provide evidence that this effect is driven by internal attribution, but is not driven by the inferred expertise nor the perceived quality of outcomes of automation.

Four hundred and six participants of US nationality recruited on Prolific (197 females, \(M_{age} = 31.6, SD = 11.54\)) were randomly assigned to one condition of a 2 (strength of identification: strong identification vs. control) x 2 (automated task: more vs. less-skill-required) between-participants design. The scenarios used were similar to those in Study 3. However, in Study 3b, participants in all conditions were told that they were not particularly skilled and that the quality of the bread or dough made by the bread-maker or dough-mixer would be identical to the quality of bread or dough made by hand. In particular, participants in the strong identification conditions read the following scenario: “Imagine that during your childhood, you used to spend time with your mother baking bread. You were not particularly skilled, though. Although you might not have baked in a long time, you still consider yourself a baker. Baking is an important part of who you are even though you are still not particularly good at it. Today you are on holiday at a resort, and you are planning to make a loaf of bread. Suppose you do not have all the equipment needed for the baking task. You can borrow some equipment from the owner of the resort. Please note that the quality of the bread (dough) (e.g. appearance, consistency, taste) made by the bread-maker (dough-mixer) would be identical to the quality of bread (dough) made by hand.” Participants in the control conditions read the same scenario without the description of the identity (i.e., without the following: “Although you might not have baked in a long time, you still consider yourself a baker. Baking is an important part of who you are even though you are still not particularly good at it”).
Participants then read the description of one of two products: Jones Bread-Maker or Jones Dough-Mixer as in Study 3. Afterwards, participants indicated their willingness to borrow the equipment on a 7-point scale (-3 = definitely will not borrow; 0 = indifferent; +3 = definitely will borrow). Then we measured the extent to which the product prevented internal attribution (“If I used this product, the bread that I made would reflect my skills as a baker,” “If I used this product, it would be hard for me to take credit for the bread that I made (reverse-coded),” “If I used this product, the bread that I made would demonstrate my baking ability”; α = .84) on a 7-point scale. As manipulation checks, participants rated their level of agreement regarding their baking identification (“I am really into baking,” “I identify myself as a baker,” “Baking is one of my favorite hobbies.”; α = .90) and expertise (“I am a good baker,” “I know how to bake well,” “I can bake well”; α = .97) as if they were the person described in the scenario. Finally, they were asked to rate which product would perform better with the following item “Please evaluate the quality of the bread/dough made by bread-maker/dough-mixer vs. the quality of the bread/dough made by hand (-3 = the quality of bread/dough made by hand is definitely better, 0 = there is no difference in quality, +3 = the quality of bread/dough made by bread-maker/dough-mixer is definitely better)”. Participants in the strong identification conditions reported higher baking identification (Mstrong = 4.91, SD = 1.51 vs. Mcontrol = 3.09, SD = 1.54, t(404) = 12.09, p < .001). However, there is no difference in inferred expertise between participants in the strong identification conditions and those in the control conditions (p = .16). The quality of dough made by dough-mixer is perceived to be superior than that made by hand (M = 4.24, t(204) = 3.71, p < .001), whereas the quality of bread made by bread-maker is perceived to be of the same quality than that made by hand (M = 4.03, p = .70). There is no interaction between identity and type of automation on perceived outcome quality (p = .88).
A 2 x 2 ANOVA with willingness to borrow (WTB) as dependent variable revealed an interaction (F(1, 402) = 3.79, p = .052). Neither the main effect of strength of identification (p = .14) nor the main effect of automated task (p = .28) was significant.

Consistent with our hypotheses, when automation involved a task that required more skill (i.e., bread-baking), WTB was lower in the strong identification condition than in the control (M_{strong} = .91, SD = 1.92 vs. M_{control} = 1.51, SD = 1.57; F(1, 402) = 5.80, p = .016). However, when automation involved a task that required less skill (i.e., dough-mixing), WTB did not differ between strong identifiers and control participants (p = .74). These findings replicate those of Study 3. In addition, dough-mixer allowed higher potential for internal attribution than bread-maker (M_{dough-mixer} = 4.05, SD = 1.54 vs. M_{bread-maker} = 2.67, SD = 1.29; t(404) = 9.77, p < .001). We conducted a 2 x 2 ANOVA on internal attribution and found a main effect of automated task (F(1, 402) = 95.26, p < .001) but no main effect of identity (p = .72) or interaction (p = .34).

*Moderated Mediation.* We proposed that products that automate tasks that require more vs. less skill to be performed manually are differently preventative of internal attribution, which selectively impacts WTB of strong identifiers. Statistically, and like in Study 3, we tested this prediction by conducting a moderated mediation analysis using 5,000 bootstrapped samples (Hayes 2012; PROCESS model 14) with automated task as the independent variable, internal attribution as mediator, strength of identification as moderator, and WTB as dependent variable. The model was significant (b = -.35, SE = .16, 95% CI: -0.67 to -0.02). Participants considered the bread-maker as more preventative of internal attribution than the dough-mixer (b = -1.38, SE = .14, 95% CI: -1.66 to -1.10), which decreased WTB (b = .23, SE = .08, 95% CI: .06 to .39). Internal attribution decreased WTB among participants in the strong identification condition (b = -.66, SE = .13, 95% CI: -.94 to -
0.42) and also among participants in the control condition (b = -.31, SE = .12, 95% CI: -.54 to -.09), albeit to a lesser extent.
Web Appendix K: Strength of Identification Manipulation (Study 4)

**Strong Identification Condition**

Imagine you used to go fishing with your father during your childhood. You were not particularly skilled.

Although you might not have gone fishing in a long time, you still consider yourself a recreational fisherman. Fishing is an important part of who you are even though you are still not particularly good at it.

Today you are visiting a friend who lives in another city. Your friend suggests going fishing. You can borrow one of the following fishing rods from a fishing store next door:

**Control Condition**

Imagine you used to go fishing with your father during your childhood. You were not particularly skilled.

Today you are visiting a friend who lives in another city. Your friend suggests going fishing. You can borrow one of the following fishing rods from a fishing store next door:
Web Appendix L: Fishing Rods (Study 4)

*Automated fishing rod*

Smith fishing rod is made of quality materials. It comes with an automatic fishing hook setting device which attaches to the fishing rod. It automatically sets the fish hook when a fish takes the bait while the pole is unmanned.

*Control fishing rod*

Jones fishing rod is made of fine materials. It is sensitive, making it easy to feel slight movements. Its three-part cork handle allows for a firm grip and great control.
Web Appendix M: Motive Manipulation (Study 5)

Identity motive

Lately you are considering buying a new bicycle for weekend excursions. These excursions feature a few different courses of approximately 10 miles. During these activities, you can enjoy the cycling activities and enhance your skills as a cyclist. You want to minimize your cycling time that is not part of the excursion (e.g., getting to the start).

Non-identity motive

Lately you are considering buying a new bicycle for commuting to work. The distance between your office and your apartment is approximately 10 miles. You live in a city with congested traffic and riding a bicycle would save you a lot of time to get to the office. You want to minimize the time of the ride to facilitate your commute.
Web Appendix N: Pre-test Results (Study 6)

In order to validate the automation manipulation, we pretested the degree to which the products in the main study were perceived to substitute and to complement the user’s skills. Ninety-nine students at a Dutch university (52 females, M_age = 19.8, SD = 1.56) participated in this lab pre-test in return for course credits. Participants read the three cooking product descriptions from the main study (skill-replacing automation, skill-allowing automation, non-automated baseline; see below) on separate screens and in random order. For each product description, participants rated the degree to which the product replaces consumers’ skills (“This product substitutes the user’s cooking skills”) and allows consumers to use their skills (“This product complements the user’s cooking skills”). A paired-samples t-test reveals that the product description in the skill-replacing automation was perceived as substituting the users’ cooking skills more than the skill-allowing automation (M_skill-replacing = 5.64, SD = 1.47 vs. M_skill-allowing = 4.25, SD = 1.84; t(98) = 7.31, p < .001). Conversely, the skill-allowing automation was perceived as complementing the user’s cooking skills more than the skill-replacing automation (M_skill-replacing = 3.08, SD = 1.78 vs. M_skill-allowing = 4.54, SD = 1.76; t(98) = -6.86, p < .001). Compared to the baseline product with no automated features, the skill-replacing automation was perceived as substituting more the users’ cooking skills (M_skill-replacing = 5.64, SD = 1.47 vs. M_no_automation = 2.69, SD = 1.87; t(98) = -12.59, p < .001) and as complementing less the users’ cooking skills (M_skill-replacing = 3.08, SD = 1.78 vs. M_no_automation = 5.31, SD = 1.69; t(98) = 8.75, p < .001). Similarly, the skill-allowing automation was perceived as substituting more the users’ cooking skills (M_skill-allowing = 4.25, SD = 1.84 vs. M_no_automation = 2.69, SD = 1.87; t(98) = -7.02, p < .001) and as complementing less the users’ cooking skills than the baseline product with no automated feature (M_skill-allowing = 4.54, SD = 1.76 vs. M_no_automation = 5.31, SD = 1.69; t(98) = 3.84, p < .001), but to a lesser extent.
Web Appendix O: Cooking Products (Study 6)

No automation

Smith Cooking Set is a complete cooking set that includes covered casserole, sauce pan, fry pan, 10-piece knife set, 5-piece nylon tools, a rolling pin, a balance and a thermometer.

With this set, you can perform different cooking tasks including weighing, kneading, blending, steaming, cooking, beating, precise heating and stirring. You can make sauce, soup, salad, pasta, pizza to cake or sorbet. Cooking has never been easier and more satisfying.

Skill-replacing automation

Smith Automatic Cooking Machine combines nine appliances in one with functions that include weighing, kneading, blending, steaming, cooking, beating, precise heating and stirring.

You can follow onscreen recipe instructions from sauce, soup, salad, pasta, pizza to cake or sorbet for a step by step guaranteed success. The recipes have been tailor made to work perfectly with the appliance - all you need to do is add the ingredients, and Smith Automatic Cooking Machine will set the temperature and timings for you. The entire cooking process is completed for you at the touch of a button. Cooking has never been easier and more satisfying.

Skill-allowing automation

Smith Automatic Cooking Machine combines nine appliances in one with functions that include weighing, kneading, blending, steaming, cooking, beating, precise heating and stirring.
Apart from following the in-built recipes from sauce, soup, salad, pasta, pizza to cake or sorbet, you can recreate your own family favorites to create culinary masterpieces. You have complete control over your food and your recipes. You can manually select your time, temperature and speed. The entire cooking process is accomplished by you with the guidance of the machine. Cooking has never been easier and more satisfying.
Web Appendix P: Robustness check (Study 6)

As a robustness check, we considered the possible role of gender. It is possible that females and males differ in terms of cooking identity and that females chose differently from males in each condition. This could be a concern in this study because identification is measured rather than manipulated. We thus estimated a regression model on product liking with the three conditions (baseline, skill-replacing automation, skill-allowing automation condition), the continuous measure of cooking identification and gender. There was no marginal main effect of gender (p = .42). There was no interaction effect between gender and any of the predictor variables (ps > .28). Nonetheless, the interactions between skill-replacing automation and identification (b = -.51, t(392) = -5.29, p < .001) and between skill-allowing automation and identification remain significant (b = -.24, t(392) = -2.49, p = .013).
Web Appendix Q: Coloring Study (Consequential Choice)

Four hundred and six students from a Dutch university participated in the study in exchange for course credits (207 females; M_{age} = 19.9, SD = 1.42). Participants were told that they had to finish a coloring task and could choose between performing a paint-by-numbers task (in which participants would color a picture as indicated by designated numbers, with each number representing a color) or free-paint task (i.e., in which participants would color a picture as they wish). Then we asked participants to indicate their agreement with three statements capturing their need for internal attribution (“It was important for me to know that I was creative when I was coloring the picture,” “It was important for me to feel proud of the picture I had colored,” “It was important for me to take credit for the picture I had colored.”; α = .78) and with three statements measuring their level of identification as a creative person (“I identify myself as a creative person,” “I think of myself as someone who is creative,” “Being creative is an important part of who I am.”; α = .96). Finally, they proceeded to do the coloring task. Participants who identified themselves as more creative were less like to choose paint-by-numbers (b = .095, t(404) = 6.29, p < .001). In a bootstrapping analysis with 5,000 samples the effect of strength of identification on choice was mediated by need for internal attribution (b = .32, 95% CI: .24 to .40), suggesting that strong identifiers might dislike convenience other than automation because of a similar internal attribution mechanism.