

# **Call Me Robot: The Effect of Automation Name on Consumers' Evaluation of Service Failure**

## **Abstract**

Businesses all over the world are investing in automation to increase efficiency and minimize costs. However, in a future not far away, made even closer by the Covid-19 global pandemic, consumers will have to interact only with machines. How will consumers react then to automation in service contexts? While previous research mostly focuses on consumers' reactions to robots rather than humans, we focus on the comparison between robots and automated machines. We propose that people attribute different levels of agency to automation depending on how automation technologies are named (robot vs. automated machine). In turn, the perceived level of agency influences how consumers respond to the technology during a service failure. Consumers are more likely to be indulgent toward a robot than an automated machine because they attribute more agency to the robot. We tested our hypothesis in three studies. The paper contributes to our understanding of human-computer interactions, shading light on how consumers respond to robots and automated machines during service failure.

**Keywords:** automation, robot, service failure

**Track:** Tourism Marketing

## 1. Introduction

The introduction of automated machines and service robots is a reality that many businesses in hospitality industry are nowadays facing (Mende et al., 2020). Most of the existing literature has been focusing on the comparison between human and robots in different situations to study the effect that robots have on human behavior (e.g., Belanche et al., 2020; Chan, & Tung, 2019; Ho et al., 2020). For example, previous studies have shown that people tend to engage in compensatory behaviors when they interact with a humanoid robot because the robot elicit greater consumer discomfort and threat to consumers' human identity (Mende et al., 2020). People also prefer to receive medical advice from a human (rather than a robot) because they believe the robot is not able to recognize their uniqueness (Longoni et al., 2018). Finally, people perceive a robot service provider to have less control over a service outcome than a human service provider and attribute less fault to the robot than the human when the failure occurs (Leo & Huh, 2020).

Nevertheless, current investments in automation will make the interactions between humans and automated machines a reality and will pave the way for a future in which machines will likely replace humans in many jobs. In some parts of the world, some hotels no longer employ humans for reception and concierge services, delegating these tasks entirely to service robots (Rajesh, 2015). Moreover, the need for reduced human contact brought about by the COVID-19 global pandemic has accelerated the introduction of automation in many service contexts. Thus, understanding how individuals react to nonhuman entities is increasingly important. For most people, the impact of this increasing automation has been largely positive, providing lower prices and more consistent quality (Yam et al., 2020). However, the extent to which the interactions with machines will affect consumers remains an open question.

In our study, we propose that consumers' reactions to automation depends on the way in which automation is presented and named. In particular, we build on previous findings in the domain of anthropomorphism (e.g., Epley et al., 2007) and mind attribution (Gray et al., 2007), to show that people attribute agency to objects not only when the objects have human physical appearance, but also when they are simply named in different ways (a robot vs. an automated machine). Different names activate people's expectations on how the object should behave which, in turn, affect consumers' responses to the object itself. We test this effect in the context of service failure. Service failures not only negatively impact customers' confidence in an organisation (Cranage, 2004), but they can also critically affect customers'

evaluation of the service, brand perception, and loyalty. In one Implicit Association Test (IAT) and two experiments, we show that people tend to associate the word “robot” with smartness more than the word “automated machine”. As a result, in case of service failure, people are more likely to evaluate the service more positively when they interact with a robot rather than an automated machine as they attribute higher agency to the robot.

The paper makes several contributions. First, we contribute to the literature on anthropomorphism (Blut et al., 2021) by showing that people tend to attribute agency to an object depending on not only physical appearance, but also on the way in which the object is labelled (robot vs. machine). Second, we contribute to the literature on automation in service failure by expanding the current findings on the effect of anthropomorphism on service evaluation. In contrast to previous findings (Yam et al., 2020), we show that participants are more likely to forgive a robot (than an automated machine) because they perceive higher agency in the robot.

## **2. Theoretical Framework**

Anthropomorphism is defined as the tendency to attribute humanlike characteristics, motivations, intentions, and emotions to nonhuman agents (Epley et al., 2007). Traditionally, previous literature has manipulated anthropomorphism by altering products’ physical features (e.g., Aggarwal & McGill, 2007; Chandler & Schwarz, 2010), and nonphysical features (e.g., voice, gestures). However, the attribution of humanlike characteristics can be independent from the attribution of humanlike mental states to products (Kim & McGill, 2018). Perceiving an object as a cognitive agent with the ability to think, feel, and act on its own requires an independent, one-step further progression of anthropomorphism beyond merely noting physical features that humans usually have. In the paper, we propose that beyond the physical appearance, people have some stereotypical perceptions of the extent to which an object possesses agency. Thus, by naming the object in a particular way, people will activate schemas on what the object can do. Specifically, we propose that people attribute more agency to automated machines when they are presented with the word *robot*. This happens because of consumers’ subconscious belief that *robots* are more intelligent than traditional *machines*. Importantly, this belief is activated regardless of whether individuals can observe the physical appearance of such robots.

*H1: People attributes higher agency to a service machine when it is labelled as a robot rather than as an automated machine.*

Attribution of agency to objects influences how people treat them (Gray et al., 2007) and interact with them (Chandler & Schwarz, 2010). According to previous findings people are more likely to attribute higher warmth to an anthropomorphic robot (Kim et al., 2019) and to evaluate the robot better in case of service failure (Choi et al., 2020; Yam et al., 2020). In line with these findings, we propose that the reaction to a service failure caused by a robot (vs. an automated machine) will depend on perceived agency of the robot. When consumers hear the word *robot* (rather than *automated machine*), they tend to implicitly attribute more humanlike characteristics and agency to the machine. Higher perceived similarity to humans will lead consumers to treat the robots as they would treat other humans, enhance empathic reactions towards the transgressor, and make people more likely to forgive the machine in case of service failure (Tsarenko et al., 2019). Moreover, previous literature has shown that people are more likely to forgive people who belong to the same group (Wohl & Branscombe, 2009). Thus, by recognizing agency to the robot, people are more likely to perceive the robot as similar to them and forgive the robot if something goes wrong. Therefore, we propose that people will evaluate a service more positively when the service failure comes from a robot because they would attribute higher agency to robot (vs. the automated machine) and thus be more forgiving.

*H2: People will attribute higher agency to a robot (vs. an automated machine), which, in turn, will increase the evaluation of the service in case of service failure (vs. success).*

### **3. Overview of the Studies**

We tested our hypotheses in 3 studies. In Study 1, we implement an IAT to show consumers' tendency to attribute higher agency to robots than to automated machine. In Study 2a and Study 2b, we test the effect of automated machine (vs. robot) on consumers' evaluation of the service and the service provider in case of service success (vs. service failure).

#### *3.1. Study 1*

In Study 1, we aim to test the tendency of consumers to attribute agency to objects when they are presented with the label "robot" instead of "automated machine". To avoid demand

effects, we used a survey-based version of the IAT (Carpenter et al., 2019). The IAT assesses the degree to which target pairs (*robots* vs. *automated machines*) and categories (*intelligent* vs. *unintelligent*) are mentally associated.

Participants placed their hands on the keyboard and completed seven blocks of stimuli sorting trials. The premise behind the IAT is that one can more rapidly sort stimuli when pairings are compatible with associations. For example, if people see automated machines as less intelligent than robots, they should respond faster when using the same hand for robots and intelligent and the other hand for automated machines and unintelligent (known as a “compatible block”). Conversely, one should be slower when pairings are reversed (an “incompatible block”).

In Study 1, participants ( $N = 82$ ; 73% female;  $M_{\text{age}} = 22.91$ ,  $SD_{\text{age}} = 0.94$ ) had to sort different words to describe robots and automated machines (e.g., cyborg, android, self-service machine, self-ordering machine) with different words describing agency (e.g., smart, clever, competent, stupid, dumb, incompetent).

### 3.1.1. Results Study 1

To interpret the results of the IAT, a standardized difference score called *D-score* was computed (Lane et al., 2007). Results indicated a positive D-score, meaning that participants responded faster when the automated machine images were paired with the “unintelligence” words than when the robot images were paired with the “unintelligence” words ( $M_{D\text{-score}} = 0.150$ ,  $SD_{D\text{-score}} = 0.486$ ;  $t(80) = 2.783$ ,  $p < 0.001$ ). The results also indicate that participants responded faster when the automated machine images were paired with the “unintelligence” words than when the robot images were paired with the “unintelligence” words.

The results from Study 1 show preliminary evidence that consumers subconsciously believe that *robots* are more intelligent than traditional *machines* and that this belief is activated regardless of whether individuals can observe the physical appearance of such robots.

### 3.2. Study 2a

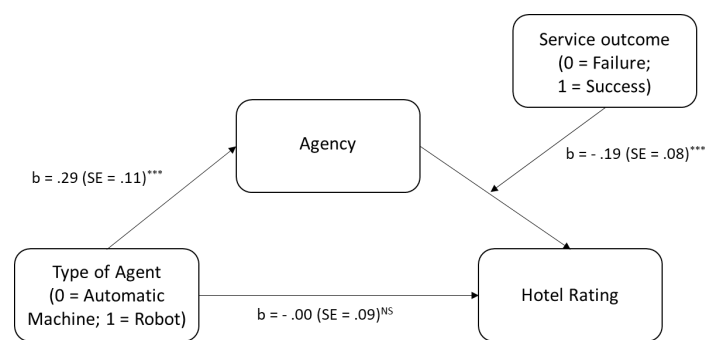
In Study 2a, we recruited 400 US participants (85% female, 4% non-binary;  $M_{\text{age}} = 24.17$ ,  $SD_{\text{age}} = 6.82$ ) on Prolific. In the study, we employed a 2 (type of agent: robot vs. self-check in machine)  $\times$  2 (service outcome: success vs. failure) between-subjects design. At the beginning of the study, participants were asked to imagine they had to check in in a hotel

using either a robot or an automated machine. After checking in, some participants were told that they could successfully enter their room (success condition) while other could not (failure condition). All the scenarios were adapted from previous studies (see Belanche et al., 2020; Choi et al., 2020; Ho et al., 2020). Then, we asked participants to rate the overall experience using a 5-star rating system mimicking rating systems commonly used by companies and reviews' aggregators online (Ho et al., 2020). Moreover, we recorded on a 7-points scale participants' likelihood of engaging in negative word of mouth (WOM;  $\alpha = 0.88$ , Grappi et al., 2013), and their evaluation of the hotel ( $\alpha = 0.98$ ; Keaveney et al., 2012).

As a measure of agency, participants reported the extent to which the machine described in the scenario had “a mind of its own”, “intention”, “a personality”, and “free will” (Kim & McGill, 2018). At the end, participants answered some questions such as frequency of travel, familiarity with artificial intelligence, fear of Covid 19, demographic information (gender, age), manipulation check, and attention check.

### 3.2.1. Results Study 2a

To analyse the effect of type of agent and service outcome on consumers' evaluation of the service, we ran a conditional moderated mediation analysis on PROCESS (model 14, Hayes, 2012) with a sample of 374 participants. We included familiarity with artificial intelligence, usage frequency, and gender as covariates in the model. The results are graphically presented in Figure 1.



Note: 95% CI Bootstrap 10000; \*\*\*  $p < .001$

The results show that compared to the automated machine, participants attributed more agency to the robot ( $b = .2954$ ,  $SE = .1134$ , 95% CI [.0664, .5124]). Moreover, an increase in agency leads to an increase in hotel rating ( $b = .2397$ ,  $SE = .0715$ , 95% CI [.0991, .3803]). Most importantly, the index of moderated mediation was significant (Index =  $-.0589$ ,  $BootSE = .0405$  95% CI [-.1568, -.0013]). In particular, the results indicate that the indirect

effect of type of agent on hotel rating through perceived agency depends on the service outcome. When the service is a failure, participants tend to give higher hotel rating when they perform the check-in with the robot instead of the automated machine (.0708, BootSE = .0383, CI 95% [.0112, .1584]). When the service is a success, there is no significant effect of type of agent on hotel rating (.0119, BootSE = .0176, [-.0245, .0476]). The direct effect of type of agent on hotel rating was not significant ( $b = -.0080$ ,  $SE = .0929$ , 95% CI [-.1906, .1747]). We obtain similar results using negative WOM or overall evaluation of the experience as main dependent variables.

### 3.3. Study 2b

The objective of Study 2b is to generalize the effect shown in Study 2a to a different service context (restaurant) and to a different type of interaction with the service agent (tapping on the object to make the order).

We recruited 400 US participants (76% female, 3% non-binary;  $M_{age} = 26.14$ ,  $SD_{age} = 7.87$ ) on Prolific. We followed the same procedure of Study 1a. The study employed a 2 (type of agent: robot vs. self-check in machine)  $\times$  2 (service outcome: success vs. failure) between-subjects design. Differently from Study 2a, participants read a scenario describing a hypothetical order in a restaurant (Choi et al., 2020). In this case, participants had to order through a robot or an iPad and, after some time, received either the correct or incorrect order. Both iPad and robot performed tasks in the same way. After reading the scenario, participants answered some questions about restaurant rating (Ho et al., 2020), positive word of mouth (Markovic et al., 2018), and restaurant evaluation (Keaveney et al., 2012). We also recorded the measure of agency (Kim & McGill, 2018), control variables, manipulation check, and attention check of Study 2a.

#### 3.3.1. Results of Study 2b

After excluding 26 participants, we run a conditional moderated mediation on PROCESS (model 14, Hayes 2012) to analyse the effect of type of agent and service outcome on consumers' evaluation of the restaurant. We included familiarity with artificial intelligence, usage frequency, and gender as covariates in the model and positive WOM as main dependent variable.

The results show that participants attributed higher agency to the robot than they did to the automated machine ( $b = .4847$ ,  $SE = .1281$ , 95% CI [.2327, .7367]). Moreover, an

increase in agency leads to an increase in positive WOM ( $b = .3259$ ,  $SE = .0682$ , 95% CI [.1918, .4599]). Most importantly, the index of moderated mediation was significant (Index =  $-.1560$ ,  $BootSE = .0639$ , 95% CI [-.2911, -.0440]). In particular, the results indicate that the indirect effect of type of agent on WOM through agency depends on the service outcome. When the service is a failure, participants tend to engage more in positive WOM when they perform the check in with the robot rather than the automated machine (.1580,  $BootSE = .0583$ , CI 95% [.0544, .2823]). When the service is successful, there is no significant effect of type of agent on WOM (.0020,  $BootSE = .0324$ , [-.0609, .0688]). The direct effect of type of agent on WOM was not significant ( $b = .1119$ ,  $SE = .1244$ , 95% CI [-.1327, .3565]). In Study 2a and 2b, we found evidence supporting H2.

#### 4. Conclusions

Across 3 studies, we show preliminary evidence that people tend to attribute agency to a service provider when it is simply named as a *robot* rather than as *automated machine*. Moreover, in the case of service failure, people are less likely to evaluate the service negatively when the mistake is committed by a robot (rather than by an automated machine), because they tend to attribute higher agency to the robot. Future studies will investigate the role of machine labelling and perceived agency as antecedents of consumers' reactions.

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