

Robots Make Humans Shine: Working Alongside Robots Enhances Support of Human Employees

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Cite as:

Yang Feng, van Doorn Jenny, Yu Jiangnan (Johnny) (2026), Robots Make Humans Shine: Working Alongside Robots Enhances Support of Human Employees. *Proceedings of the European Marketing Academy*, 55th, (133895)

Paper from the 55th Annual EMAC Conference, Bath, United Kingdom, June 2-5, 2026



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Abstract

Robots are becoming increasingly integrated into the human workforce, leading to the rise of human-robot teams as a new form of workplace collaboration. Although existing literature has begun exploring how consumers react to robots in such settings, insights on how consumers perceive and react to a human employee working with a robot are scarce and conflicting. Across three studies, including a field experiment with an embodied robot, we find that consumers attribute greater humanness to a human employee working alongside a robot compared to one working alongside another human, which in turn strengthens ingroup categorization. This sequential process ultimately drives more favorable consumer responses: consumers are more likely to support the employee in terms of responding positively to their requests for help and feel less dissatisfied after a service failure. However, this benefit disappears when the failure is perceived as controllable (vs. uncontrollable) by the employee.

Keywords: human-robot team, dehumanization, intergroup processes

Track: Service Marketing & Service Innovation

1. Introduction

Robotics and artificial intelligence (AI) are increasingly used to address labor shortages, with service robots taking on tasks traditionally performed by humans (Becker et al. 2022). While research on service robots has expanded quickly, most studies focus on dyadic encounters in which consumers interact with either a human or a robot alone, generally finding less favorable responses to robot-delivered service (Castelo et al. 2023). Yet the future of work is expected to rely on human–robot (cobotic) teams, where humans and robots jointly serve consumers (Shanks et al. 2025).

A small but growing literature examines such triadic encounters, showing that consumers often respond more positively to collaborative than replacement robots and that human employees can buffer poor robot performance (Odekerken-Schröder et al. 2021; Shanks et al. 2025). However, these studies largely overlook how robots reshape perceptions of the human employee. Emerging evidence suggests robots can both undermine and enhance consumer–employee relations: employees working with robots exhibit lower warmth due to emotional fatigue (Lv et al. 2024) yet highlighting robot-driven replacement risk can evoke a sense of shared human identity, thereby reducing prejudice (Jackson et al. 2020).

We propose that working alongside a robot (vs. another human) accentuates the employee's humanness, increasing ingroup perceptions and leading to more favorable consumer responses. Across three studies, including a field experiment with an embodied robot, we demonstrate that employees working with robots are seen as more human and elicit greater consumer support. We also identify a key boundary condition: when a mistake is perceived as controllable by the employee, heightened humanness no longer leads to more positive consumer responses.

Our work contributes by shifting from dyadic to triadic service encounters, illuminating how robots alter perceptions of human employees, and establishing humanness attribution and ingroup categorization as key psychological mechanisms. For managers, our findings suggest that concerns about dehumanizing effects of human–robot teams may be overstated; robots can help employees stand out positively, yet this positive effect vanishes when service failures are perceived as controllable.

2. Theoretical Framework and Hypotheses Development

2.1. Exposure to robots and (de)humanization of employees

Humanness attribution refers to the inferential act of an individual ascribing the human mind such as intentions, beliefs, desires, and feelings to others (Ames & Mason, 2012). This mainly involves two dimensions of attribution: experience (the capacity to sense and feel pleasure, emotion, and pain) and agency (the capacity for cognition, intentional action, and free will) (Waytz et al., 2010). Failing to fully recognize others' humanness—a phenomenon known as dehumanization—has consistently been linked to negative interpersonal behaviors such as prejudice, aggression, and violence (e.g., Vaes et al., 2002; Kteily et al., 2015). In service contexts, consumers are more likely to treat employees harshly when they attribute lower humanness to them (Henkel et al., 2018; Kim and McGill, 2024).

Recent work suggests that robots may influence how consumers perceive human employees. Kim and McGill (2024) show that interacting with a robot with high socioemotional capabilities can lead consumers to dehumanize “humans in general.” However, these findings operate at an abstract level; real service interactions involve specific employees, and effects at the category level do not always translate to judgments of individuals (Bless & Schwarz, 2010).

Dehumanization occurs through deliberate denial of others' minds (active commission) or, more commonly, through passive omission—overlooking others' minds due to limited cognitive resources (Waytz & Schroeder, 2014). Passive omission is especially likely when individuals seem interchangeable, such as in homogeneous groups (Taylor et al., 1978), whereas heterogeneity helps preserve individuality.

Applying this logic, a human–robot team constitutes a more heterogeneous group than a human–human team due to salient differences in appearance and capabilities. This heterogeneity should make the human employee in a human–robot team more individuated and less susceptible to passive omission, increasing perceived humanness relative to a human–human team. Formally:

H1: Consumers attribute more humanness to a human employee working alongside a robot (vs. a fellow human).

2.2. Humanness attribution, intergroup categorization and consumer responses

Humanness is central to the superordinate identity of being human. When an employee appears more human, this shared identity becomes more salient, increasing the likelihood that consumers categorize the employee as an in-group member. This follows the common ingroup

identity model (Gaertner et al., 1993), which posits that emphasizing a shared superordinate category reduces subgroup distinctions and fosters more favorable evaluations.

Social categorization strongly influences interpersonal behavior: individuals consistently show more positive responses toward in-group members than out-group members, even when groups are arbitrarily assigned (Billig & Tajfel, 1973). This demonstrates how in-group categorization fosters favorable evaluations and behaviors. Thus, when a human employee works with a robot (vs. another human), enhanced humanness attribution should strengthen in-group categorization and consequently promote more positive consumer responses. Formally:

H2a: Consumers respond more positively to a human employee working alongside a robot (vs. a fellow human).

H2b: The positive effect of working alongside a robot (vs. a fellow human) on consumer responses is serially mediated by increased humanness attribution and stronger ingroup categorization.

2.3. The moderating role of service failure controllability

Although ingroup categorization typically produces favorable responses, it can also lead to harsher judgments when an in-group member violates expectations tied to the shared identity (Eidelman & Biernat, 2003). In service contexts, service failures represent violations of expected norms, and consumer reactions depend on the perceived controllability of the failure (Bitner, 1990). When consumers view an employee as part of their human in-group, they hold stronger expectations regarding core human traits such as intelligence and purposeful action (Waytz et al., 2010). Controllable failures, those the employee could have avoided with effort (Weiner, 2000), signal a violation of these expectations. Such violations threaten the integrity of the shared human identity, prompting consumers to respond even more negatively toward the employee as a way of reaffirming and defending that identity. Thus, the positive responses elicited by human–robot teams should diminish when the failure is viewed as controllable. Formally:

H3: The positive effect of working alongside a robot (vs. a fellow human) on consumer responses is attenuated when the service failure is perceived as controllable (vs. uncontrollable).

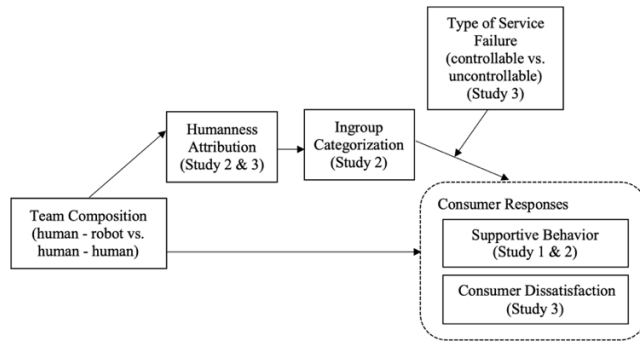


Figure 1: Conceptual model

3. Study 1

Field Study 1 used a real human–robot interaction to test whether consumers are more likely to support a human employee working with a robot versus a fellow human. As participants were unaware that their supportive behavior was being tracked, the study closely resembled a naturalistic field experiment embedded within a lab setting. Over 16 non-consecutive days, 297 undergraduates at a large European university took part in a between-subjects design (human–human team vs. human–robot team). After completing unrelated tasks, participants were checked out individually by a lab employee who requested a small personal favor. They were taken to a separate room where the employee was seated next to either a human coworker (human–human condition) or a robot (human–robot condition; see Figure 2). The employee asked participants to complete a brief (2-minute) questionnaire to support her thesis. Supportive behavior was measured by whether participants completed the questionnaire, tracked through condition-specific QR codes.

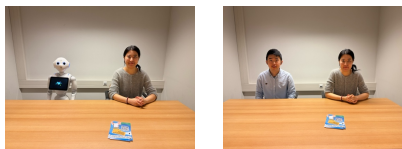


Figure 2: Experimental setup in Study 1

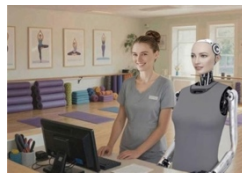
Participants were more likely to support the employee when she worked with a robot than with another human (17.39% vs. 9.35%; $\chi^2(1, 277) = 3.86, p = .049, \phi = .12$). H_{2a} is supported.

4. Study 2

Study 2 examined supportive behavior again and tested the mediating roles of humanness attribution and ingroup categorization (H_{2a} , H_{2b}). Participants ($N = 450$ female Prolific users; $M_{age} = 41.53$) were randomly assigned to one of three team conditions: human–human, human–high-anthropomorphism robot, or human–low-anthropomorphism robot. Participants imagined attending a yoga class and interacting with a female front-desk employee working alongside either another woman or a robot (high vs. low anthropomorphism; see Figure 3). The employee requested a small personal favor—mention her by name in a positive online review. Supportive behavior was measured as a binary choice. Humanness attribution (agency and experience; Kozak et al., 2006) and ingroup perception were assessed. Manipulation checks asked participants to identify the employee on the right and left side a human or a robot.



human–human



human–high
anthropomorphism robot



human–low
anthropomorphism robot

Figure 3: Stimuli used in Study 2

Excluding 25 participants who failed the manipulation checks, supportive behavior was higher when the employee worked with a high-anthropomorphism robot (85.6%) or a low-anthropomorphism robot (91.9%) compared to another human (77.7%; $p = .035$ and $p = .001$, respectively), with no difference between the two robot conditions ($p = .085$). Team composition also affected the proposed mediators: both humanness attribution and ingroup categorization were higher in the robot conditions than in the human condition (all $p < .001$). The two robot conditions did not differ (ingroup categorization: $p = .600$; humanness attribution: $p = .733$).

Serial mediation analyses (PROCESS Model 6) supported the proposed pathway (team $\rightarrow$ humanness attribution $\rightarrow$ ingroup categorization $\rightarrow$ supportive behavior). The indirect effect was significant for both robot conditions relative to the human-human condition (high anthropomorphism: $a \times b = 0.52$, 95% CI [0.35, 0.77]; low anthropomorphism: $a \times b = 0.50$, 95%

CI [0.32, 0.76]). Direct effects were nonsignificant once mediators were included, indicating full mediation. The two robot conditions did not differ in their indirect effects ($a \times b = -0.02$, 95% CI [-0.15, 0.11]). Overall, these results support H_1 and H_2 .

5. Study 3

We recruited 401 Prolific participants (146 male; $M_{\text{age}} = 42.99$) and randomly assigned them to a 2 (Team: human–human vs. human–robot) $\times$ 2 (Service Failure: controllable vs. uncontrollable) between-subjects design. Participants imagined a hotel stay where a woman and either a human or robot colleague provided service (See figure 4). The woman agreed to give them a wake-up call. In all conditions, the call failed. In the uncontrollable condition, the room phone unexpectedly malfunctioned; in the controllable condition, the employee simply forgot. Manipulation checks confirmed both manipulations.

A two-way ANOVA showed that controllability moderated the effect of team composition on dissatisfaction (interaction: $F = 3.72$, $p = .054$). When the failure was uncontrollable, participants were less dissatisfied when the employee worked alongside a robot versus another human ($M_{\text{human–human}} = 4.12$, $M_{\text{human–robot}} = 3.69$; $t = 2.219$, $p = .027$). When the service failure is controllable, dissatisfaction does not differ by team ($M_{\text{human–human}} = 5.87$, $M_{\text{human–robot}} = 5.97$; $t = -0.506$, $p = .613$).



Figure 4: Stimuli used in Study 3

Moderated mediation analysis (PROCESS Model 14) showed that the overall humanness attribution mediates the effect of team on consumer dissatisfaction when the service failure was uncontrollable (Indirect effect = -0.4394 , 95% CI [-0.6641, -0.1975]). However, when the service failure was controllable, there is no mediation effect (Indirect effect = 0.0181 , 95% CI [-0.1427, 0.1916]). The results support our H_3 .

6. General Discussion

Recognizing others as unique human beings is fundamental to social welfare, yet modern organizational and consumer environments often obscure employees' individuality. Across three studies, we show that embedding robots into the workforce can counteract this tendency. Unlike the apocalyptic scenario depicted by the public press which disseminates the threat of robots, our research revealed that robots benefit human employees by spotlighting them as mindful humans.

These findings advance research on how technology shapes humanness attribution (Ames & Mason, 2012). Robots, however, unlike impersonal technologies, possess social presence and can directly influence social categorization (van Doorn et al., 2017). Our results show that human–robot teams make the superordinate identity of “being human” more salient, increasing the likelihood that consumers categorize the employee as an ingroup member—an interpersonal shift usually observed through social interaction (Crisp & Hewstone, 2007).

We also contribute to research on robot anthropomorphism. Although anthropomorphism plays a central role in human–robot interaction, its influence diminishes when a human employee is present. Consistent with van Doorn et al. (2023), even highly anthropomorphic robots remain categorically machine-like when compared with real humans. Thus, human–robot teams may attenuate typical anthropomorphism effects, such as those related to the uncanny valley.

From a managerial perspective, our findings suggest that firms need not fear negative consumer reactions to robot integration. Across different contexts, consumers responded more positively to human employees when robots were present, due to increased humanness attribution and ingroup categorization. Interestingly, organizations that rely heavily on employee–customer relationships may therefore benefit from adopting service robots.

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