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# Service robot failure: The interplay of monetary compensation and voice anthropomorphism

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## ABSTRACT

Service robots are on the rise, but still prone to failures. Consequently, practitioners and researchers are interested in how service recovery and robots should be designed to optimize service failure and recovery situations. Key issues are the choice of recovery strategies and the design of service robots, particularly with regard to service robot anthropomorphism. Our results show that an anthropomorphic voice plays no role when monetary compensation is offered, as monetary compensation dominates customer evaluations. However, when firms choose not to provide monetary compensation, using an anthropomorphic voice improves evaluations. Building on social support theory, we show that customer perceived social support mediates this interaction. We show respective effects in five studies with different types of service robots, a male and female service robot voice, and different levels of monetary compensation. Two of these studies underpin the importance of voice relative to appearance.

## 1. Introduction

As service robots become more prevalent, an increasing number of companies across various industries, including hospitality and aviation, are adopting them. For example, in Hilton hotels, the service robot Connie can be used by customers to obtain information regarding the hotel restaurant's opening hours (Sahota, 2024). In restaurants like the Wing Factory, service robots deliver food to customers (Jones, 2023). Since frontline employees are difficult to recruit and retain, service robots may offer certain cost benefits over their human counterparts (Ferguson & Hoover, 2024; Huang & Rust, 2021). Overall, service robots are a technology of great interest and increasing popularity (Wirtz et al., 2018).

Despite their growing adoption, service robots remain prone to failures, making effective service recovery strategies essential (Liu et al., 2023). Service recovery refers to “all the actions a firm can take to redress the grievances or loss caused by a service failure” (Khamitov et al., 2020, p. 520). It plays a critical role in mitigating the negative impact of service failures on customer satisfaction. In line with prior research (Gelbrich, 2010), we conceptualize service recovery as a form of social support provided to and perceived by customers after service failures. According to social support theory (e.g., Cohen et al., 2000; Lazarus & Folkman, 1984; Sarason & Sarason, 1985), perceived social support comprises instrumental (e.g., monetary compensation), emotional (e.g., apology, empathy), and informational (e.g., explanations) support, each contributing to the customer's ability to cope with a service robot

failure. These forms of support are considered social when they are perceived as originating from a social actor (Lazarus & Folkman, 1984), such as a service robot (van Doorn et al., 2017). Social support and service recovery strategies are typically introduced after the service failure (i.e., after an initial appraisal of the situation). We conceptualize them as coping resources in line with coping theory (e.g., Lazarus & Folkman, 1984) and service failure research (e.g., Gabbott et al., 2010; Strizhakova et al., 2012).

Importantly, perceived social support does not depend solely on what recovery strategy is provided but also on how it is delivered (Gelbrich, 2010). This implies that recovery effectiveness is also shaped by the robot's design, which can fundamentally alter how supportive a recovery effort is perceived to be. We therefore argue that service recovery strategies and robot design features should be examined jointly rather than in isolation. To differentiate design features, we focus on anthropomorphism, defined as “the attribution of human characteristics or traits to nonhuman agents” (Epley et al., 2007, p. 865). Anthropomorphism shapes social perceptions (Choi et al., 2021), and prior research on service robot failures has highlighted its importance in robot design (Barone et al., 2024; Cheng, 2022; Cui et al., 2023; Cui & Zhong, 2023; Ryoo et al., 2024). However, studies explicitly integrating anthropomorphism into the service recovery process remain scarce. To date, the only study directly addressing this intersection is by Choi et al. (2021), who show that anthropomorphic (vs. non-anthropomorphic) robots elicit greater perceptions of warmth, which in turn lead to more negative reactions to service failures but more favorable responses

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to recovery efforts such as apologies or explanations.

In our examination, we extend research on service recovery and robot anthropomorphism. We do so by examining the interplay between the recovery strategy of monetary compensation as an instrumental social support and voice anthropomorphism as a non-physical service robot design feature. Monetary compensation can be defined as “a resource that recompenses customers for a resource they lost due to the organization’s failure” (Roschk & Gelbrich, 2014, p. 195). We focus on monetary compensation, since it is one of the most common and impactful recovery strategies (Orsingher et al., 2010). In addition, monetary compensation is a relatively costly approach compared to alternative recovery strategies such as apologies or explanations. Consequently, it is crucial to understand how the effectiveness of monetary compensation is affected by anthropomorphism.

Regarding anthropomorphism, we focus on voice as a non-physical design feature, in contrast to most existing research that emphasizes physical design features such as appearance. We do so because voice plays a central role in human communication and can profoundly shape emotional and social perceptions (Oleszkiewicz et al., 2017; Scherer et al., 2003). Voice may in fact be superior to physical design features in providing anthropomorphism and social support because (1) voice is particularly diagnostic for social judgments as it jointly conveys linguistic (e.g., the actual content of recovery strategies) and paralinguistic information (e.g., anthropomorphism and emotional support; Kraus, 2017), (2) visual appearance is more prone to stereotypical judgments (Kraus, 2017; Lewis et al., 2012), which we suspect to be even less diagnostic for robots than for humans, and (3) facial expressions in human-to-human interactions are more likely to be masked, which is why humans may rely more heavily on voice (Kraus, 2017). From a practical standpoint, (1) voice offers a highly flexible and easily adaptable design feature, especially compared to the physical redesign of an entire robot fleet, making it a strategically valuable lever for managing customer experiences, and (2) anthropomorphization of synthetic voices is already very sophisticated (Barrington et al., 2025), while full anthropomorphization based on physical appearance (i.e., a very human-like appearance) is currently less common (Bentley, 2020). We focus on monetary compensation and voice anthropomorphism, given their importance from both theoretical and practical perspectives. To date, no study has investigated this interaction, which reflects a critical gap considering the importance of both voice anthropomorphism and monetary compensation in service robot interactions.

To address this gap, we examine respective effects on downstream, interaction-focused marketing outcomes—specifically, attitude toward the brand and customer satisfaction with the service robot following a service failure. We offer two key contributions to theory and practice. First, we respond to requests for more studies on service robot failure and recovery (e.g., Choi et al., 2021; Mir et al., 2023; Park et al., 2023) by showing that recovery effectiveness depends on service robot anthropomorphism and by contributing to this stream of research. Our results show that the use of an anthropomorphic voice does not matter when monetary compensation is offered, because monetary compensation dominates customers’ evaluations. However, when firms choose not to provide monetary compensation (e.g., due to financial considerations), using an anthropomorphic voice improves evaluations, whereas anthropomorphic appearance does not. We show the hypothesized effects across five studies in a restaurant setting, using different commonly deployed service robots, male and female voice manipulations, and varying compensation levels. Our findings align with research indicating that customers tend to prefer anthropomorphism in service interactions (e.g., Barone et al., 2024; De Visser et al., 2016).

Second, we extend the literature on service robot anthropomorphism by emphasizing the critical yet underexplored role of voice. This non-physical design feature can significantly influence anthropomorphism and, consequently, service recovery outcomes. While prior marketing research on service robots has largely concentrated on physical design features to elicit perceptions of anthropomorphism, the auditory

dimension of robot design has received far less attention. This is surprising given that voice plays a central role in human communication and can profoundly shape emotional and social perceptions (Oleszkiewicz et al., 2017; Scherer et al., 2003). Moreover, research indicates that voice may in fact be superior to physical design features in affecting social judgments (Kraus, 2017; Lewis et al., 2012) and that voice is a highly flexible and easily adaptable design feature through which anthropomorphization can be achieved at a very sophisticated level (Barrington et al., 2025). To date, no study has examined voice in the context of service robot failure and recovery, and only one study has examined a non-physical design feature (i.e., formal vs. informal communication style; Park et al., 2023). Consequently, by demonstrating that robot voice can influence the effectiveness of recovery efforts (while physical appearance cannot), we offer a novel and meaningful contribution to research on anthropomorphism in the context of service robots.

Our findings offer practical implications for managers seeking to optimize service robot design in failure and recovery contexts. We show that robot voice plays a crucial role in shaping customers’ evaluations of recovery efforts. In particular, we demonstrate that the anthropomorphic voice does not matter when monetary compensation is offered, as monetary compensation dominates customers’ evaluations. However, when firms choose not to provide monetary compensation (e.g., due to financial considerations), using an anthropomorphic voice improves evaluations. Thus, managers who are unable or unwilling to offer monetary compensation should consider leveraging anthropomorphic voices. If companies default to non-anthropomorphic voices, they should be prepared to consistently provide monetary compensation.

The remainder of this article is structured as follows. First, we present the theoretical background and prior literature on service failure, recovery, and service robot anthropomorphism. Next, we outline our hypotheses and provide an overview of the research design. We then present five studies to test our hypotheses. In Study 1, we examine the joint effects of service recovery and robot voice on attitude toward the brand. Studies 2a, 2b, and 2c aim to replicate the effects observed in Study 1 and to demonstrate the dominant role of anthropomorphic voice over anthropomorphic appearance. In Study 3, we again replicate the core interaction effect for a different outcome—customer satisfaction with the robot—and show that this effect is mediated by customer-perceived social support. Finally, we discuss the implications of our findings for theory and practice and highlight several limitations and directions for future research.

## 2. Conceptual background and hypotheses

### 2.1. Service failure and recovery

Service failure can be defined as a “service performance that falls below the expectation of one or a few customer(s)” (Khamitov et al., 2020, p. 520; Smith et al., 1999). This discrepancy between expected and perceived service outcomes can be perceived by customers as a loss, leading to negative service evaluations and low customer satisfaction (van Vaerenbergh et al., 2014). Consequently, companies try to mitigate these negative effects by providing service recovery, which can be defined as “all the actions a firm can take to redress the grievances or loss caused by a service failure” (Khamitov et al., 2020, p. 520). Service recovery may be conceptualized as a form of social support provided to customers after service failures. According to social support theory (Cohen et al., 2000; DiMillo et al., 2017; Fleury et al., 2009; Gelbrich, 2010; Lazarus & Folkman, 1984; Sarason & Sarason, 1985), social support comprises instrumental (e.g., monetary compensation), emotional (e.g., apology, empathy), and informational (e.g., explanations) support, each contributing to the customer’s ability to cope with the failure. As they are typically introduced after the service failure (i.e., after the initial appraisal of the situation), we conceptualize them as coping resources in line with social support and coping theory (e.g.,

Lazarus & Folkman, 1984) and service failure research (e.g., Gabbott et al., 2010; Kaur et al., 2022; Sengupta et al., 2015; Strizhakova et al., 2012). One of the most common and impactful social support strategies is providing monetary compensation (Orsingher et al., 2010), which may range from “modest” (20% discounts) up to “excellent” (100% discounts; Hess et al., 2003; Wirtz & Mattila, 2004). Justice theory suggests that customers assess the fairness of service recovery and that service recovery measures perceived as fair have a positive effect on marketing outcomes like customer satisfaction (Hazée et al., 2017). Moreover, empirical evidence suggests that, in some situations, customers may be more satisfied after service interactions involving a service failure and recovery rather than after service interactions in which the service was correctly performed the first time (De Matos et al., 2007).

## 2.2. Service robots and anthropomorphism

Service robots can be defined as “system-based autonomous and adaptable interfaces that interact, communicate and deliver service to an organization’s customer” (Wirtz et al., 2018, p. 909) and differ from self-service technologies in that they can socially and emotionally engage with customers, thereby reflecting the role of a social actor rather than a purely functional service interface (van Doorn et al., 2017; Wirtz et al., 2018). Service robots offer advantages for companies because they do not experience fatigue and reliably deliver a homogeneous output compared to human employees (Huang & Rust, 2018). Design characteristics of service robots can be divided into physical and non-physical characteristics, where physical characteristics include visual aspects such as heads or faces, and non-physical characteristics include behavioral aspects such as “gaze, gesture, voice, and mimicry” (Blut et al., 2021, p. 637). The degree of anthropomorphism is central to both feature types (Blut et al., 2021). Service robot anthropomorphism in physical design characteristics is achieved by the possession of legs, arms, a head, or a face (Blut et al., 2021). In terms of non-physical design characteristics, anthropomorphism reflects the degree to which service robots act like humans (Blut et al., 2021). For example, service robots may employ very anthropomorphic gestures, and their voices may sound very anthropomorphic.

## 2.3. Literature on service robot failure

The body of marketing literature addressing service robot failure and recovery remains limited (cf. Choi et al., 2021; Ryoo et al., 2024). Table 1 presents a synthesis of key scholarly contributions to this emerging research domain. To identify relevant articles, we searched marketing journals included in the 2025 Journal Quality List ([harzing.com/resources/journal-quality-list](https://harzing.com/resources/journal-quality-list)) using the keyword “robot\*” in the Web of Science database. This search yielded 314 articles, which were subsequently narrowed to those focusing on service failure or recovery. From this initial pool, nine articles were identified as directly relevant to the topic under investigation. A forward and backward search resulted in no additional articles. We reviewed the selected articles with a focus on their contributions to research on service robot recovery, particularly in relation to robot design features that facilitate anthropomorphism.

A closer examination shows that five of the nine articles focus specifically on service failure situations, without incorporating any form of recovery. All five articles examine anthropomorphism and thus emphasize its central role in shaping consumer reactions to the failure of service robots. The articles find varying effects of service robot anthropomorphism. While Cheng (2022) and Cui and Zhong (2023) suggest that lower levels of anthropomorphism reduce internal attributions and enhance tolerance and revisit intentions, Ryoo et al. (2024) report that higher levels of anthropomorphism increase perceived controllability and blame toward the robot (rather than the firm). Similarly, Barone et al. (2024) find that framing a machine as a robot, thereby activating anthropomorphic associations, enhances perceptions of agency and

mitigates negative evaluations. Cui et al. (2023) examine anthropomorphism as a moderator of the effect of anticipated trust in the service provider on brand switching. Overall, the findings on anthropomorphism in the context of service failure (without recovery) remain mixed, underscoring the need for further investigations.

Only four of the nine reviewed articles deal with service recovery, making them relevant to this study. Among them, only Choi et al. (2021) directly investigate the role of anthropomorphism in service robot design. Their findings indicate that anthropomorphic (vs. non-anthropomorphic) robots, as defined by physical design features, elicit greater perceptions of warmth. As a consequence, they find a more negative association between process failures of anthropomorphic (vs. non-anthropomorphic) robots and satisfaction and a more positive association between different types of service recovery (apology and explanation) and anthropomorphic (vs. non-anthropomorphic) robots. The remaining three articles that examine service recovery do not allow for conclusions concerning service robot anthropomorphism. Shi et al. (2022) examine the joint effects of human (vs. robotic) service providers and frontline employees’ emotional labor. However, they do not manipulate robot design features. Park et al. (2023) manipulate communication style, which is a non-physical service robot design feature not directly related to anthropomorphism. Arikan et al. (2023) manipulate human staff, anthropomorphic robots, and non-anthropomorphic robots but collapse human staff and anthropomorphic robots into a single group, or both types of robots into a single group, for their analyses. Overall, the findings on service robot recovery and anthropomorphism are very limited but indicate that warmth can be elicited by anthropomorphic robot design, which can be negative in cases of failure but positive in cases of recovery (Choi et al., 2021).

In summary, marketing research lacks studies that focus on service robot recovery and anthropomorphism. Five studies included in our literature review examine service robot failure and anthropomorphism, but none incorporate service recovery. The findings on anthropomorphism remain mixed. Three studies examine service robot recovery following service failure without contributing to research on robot anthropomorphism. The study by Choi et al. (2021) is a valuable contribution to the field of service robot recovery and anthropomorphism. However, in contrast to our study, their focus lies on the physical design features of service robots. Moreover, rather than manipulating monetary compensation, they examine apologies and explanations, although both are less effective than monetary compensation (Orsingher et al., 2010). Their comparison with a no-recovery control condition, while informative, may not fully reflect recommendations by researchers to at least provide an apology as a recovery strategy (Davidow, 2003).

## 2.4. The interplay of service robot failure recovery and anthropomorphism

We know that service recovery has a positive effect on several attitudinal and behavioral marketing outcomes in the event of a service failure (Roschk & Gelbrich, 2014). Through service recovery (i.e., social support strategies; Gelbrich, 2010), companies address service failures by offering compensation (e.g., monetary compensation; Roschk & Gelbrich, 2014). This, in turn, has a positive impact on marketing outcomes, although effect sizes may vary (Roschk & Gelbrich, 2014). We expect monetary compensation to have an effect on attitude toward the brand and on customer satisfaction with the service robot. Concerning attitude toward the brand, we argue that monetary compensation serves as a signal of the firm’s fairness (Gelbrich & Roschk, 2011). By acknowledging the problem and offering compensation, the firm takes responsibility and acts accordingly, which customers perceive positively and is reflected in more favorable brand attitudes. Regarding customer satisfaction with the service robot, we argue that, following a service failure, customers typically expect compensation to help offset their loss (Davidow, 2003). Customer satisfaction reflects the extent to which the

**Table 1**  
Literature on service robot failure and recovery.

Authors	Agent Type	Independent Variable(s)	Dependent Variable(s)	Moderators and Mediators	Recovery Focus	Type of Recovery	Anthropomorphism Focus	Type of Anthropomorphic Design Feature	Key Findings
Arikan et al. (2023)	Human staff, anthropomorphic service robot, non-anthropomorphic service robot	Agent type	Satisfaction	Moderator: recovery; mediators: failure/recovery responsibility attribution, forgiveness	Yes	Apology, reservation, and drive to alternative restaurant, discount vs. no recovery	Yes	Physical	Consumers attribute more service failure responsibility to the firm when the agent is a non-anthropomorphic service robot (vs. collapsed conditions: human and anthropomorphic service robot). The authors find support only for the mediation hypothesis: failure and recovery attributions translate into forgiveness and satisfaction.
Barone et al. (2024)	Technology appearing to be a service robot	Service robot vs. machine framing	Satisfaction, WOM	Moderator: service failure; mediator: agency	No	n/a	Yes	Physical and non-physical	Service robot framing (similar to anthropomorphism) increases agency perception and outcomes.
Cheng (2022)	Service robot	Anthropomorphism	Consumers' attribution and forgiveness	Moderators: relationship norms, involvement; mediator: internal attribution	No	n/a	Yes	Physical	Less anthropomorphism is better because it reduces likelihood of consumers making internal attributions. Service robot anthropomorphism is reportedly effective only when anthropomorphism occurs subconsciously.
Choi et al. (2021)	Anthropomorphic (vs. non-anthropomorphic) service robot	Agent type, service failure type	Behavioral intentions, satisfaction	Moderators: apology, explanation, human intervention; mediators: warmth, competence	Yes	Apology, explanation, human intervention	Yes	Physical	Anthropomorphic (vs. non-anthropomorphic) service robot is more strongly associated with warmth. Process failures result in higher dissatisfaction when caused by an anthropomorphic (vs. non-anthropomorphic) service robot, but service recoveries such as apologies or explanations are more likely to work for an anthropomorphic (vs. non-anthropomorphic) service robot.
Cui et al. (2023)	Human staff, anthropomorphic service robot, non-anthropomorphic service robot	Anticipated trust	Brand switching intention	Moderator: agent type; mediator: tolerance	No	n/a	Yes	Physical	Inverted U-shaped relationship between consumers' anticipated trust and brand switching intention mediated by tolerance. Anthropomorphic service robot strengthens (human staff and non-anthropomorphic service robot weaken) the inverted U-shaped effect.
Cui and Zhong (2023)	Anthropomorphic service robot vs. non-anthropomorphic service robot	Agent type	Revisit intention	Moderator: personalized design; mediators: performance expectation, tolerance	No	n/a	Yes	Physical	Non-anthropomorphic service robot increases performance expectations, tolerance, and revisit intentions. Personalization moderates this effect.
Park et al. (2023)	Service robot	Communication style	nWOM intentions	Moderator: failure severity; mediators: intimacy, anger	Yes	Apology, replacement	No	n/a	An informal communication style can create intimacy between customers and service robot, which mitigates negative effects.
Ryoo et al. (2024)	Human staff, anthropomorphic service robot, non-anthropomorphic service robot; analytical vs. mechanical service robot	Service robot agency, service robot intelligence	Blame attribution to firm vs. agent, willingness to revisit	Moderator: agent type; mediator: perceived controllability	No	n/a	Yes	Physical	When human service providers make mistakes, customers blame the human employee, but when service robot makes the same mistakes, they blame the associated firm instead. Humanization leads to perceived control, attracting more blame toward the service robot.

(continued on next page)

Table 1 (continued)

Authors	Agent Type	Independent Variable(s)	Dependent Variable(s)	Moderators and Mediators	Recovery Focus	Type of Recovery	Anthropomorphism Focus	Type of Anthropomorphic Design Feature	Key Findings
Shi et al. (2022)	Human vs. service robot	Emotional labor (surface vs. deep acting)	Satisfaction	Moderator: attribution; mediator: n/a	Yes	Apology and deep acting vs. apology and surface acting	No	n/a	Deep acting elicits more favorable effects on customer satisfaction than surface acting. Attribution moderates this effect.
Focal Paper	Anthropomorphic (vs. non-anthropomorphic) service robot	Monetary compensation (vs. no monetary compensation)	Attitude toward the brand, satisfaction with the service robot	Moderator: anthropomorphic voice; mediator: customer-perceived social support	Yes	Explanation vs. apology, explanation, and monetary compensation	Yes	Non-Physical	Monetary compensation (vs. no monetary compensation) and anthropomorphic voice (vs. non-anthropomorphic voice) jointly influence attitude toward the brand and customer satisfaction with the service robot. Anthropomorphic voice matters less when monetary compensation is offered, because monetary compensation dominates customers' evaluations. However, when no monetary compensation is offered, using an anthropomorphic voice improves evaluations. This effect is mediated by perceived social support. Service robot voice appears to be more crucial than appearance in service robot recovery.

Source: Own depiction.

recovery outcome meets or exceeds customers' expectations (Orsingher et al., 2010). Because monetary compensation increases the value customers receive, it should lead to higher satisfaction. We expect the respective effects in our studies and propose a corresponding hypothesis, depicted in our conceptual model (Fig. 1).

H1: Monetary compensation (vs. no monetary compensation) has a positive effect on (a) attitude toward the brand and (b) customer satisfaction with the service robot.

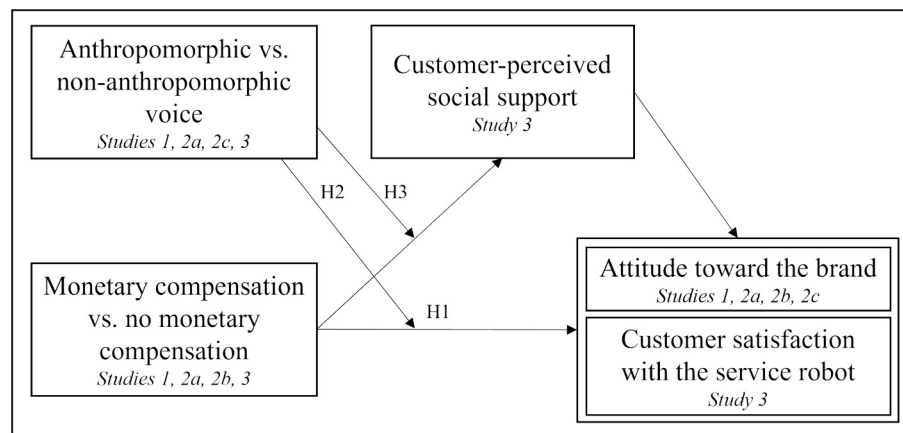
In addition, we propose that anthropomorphic voice interacts with monetary compensation. Prior research on service recovery suggests that different dimensions of justice contribute unequally to customer outcomes such as satisfaction (Gelbrich & Roschk, 2011). Distributive justice, which reflects the fairness of tangible outcomes such as monetary compensation, typically exerts the strongest influence on satisfaction in isolated service encounters, whereas interactional justice, which captures the interpersonal quality of the interaction, plays a weaker role (Orsingher et al., 2010). Building on this evidence, we argue that monetary compensation substantially improves customers' post-failure evaluations. When compensation is provided, customers' satisfaction is largely restored, leaving limited scope for additional, more subtle interpersonal cues to further improve evaluations. Accordingly, cues of interactional justice, such as voice anthropomorphism, which convey interpersonal qualities like empathy and care by giving the robot a human touch (Choi et al., 2021), are unlikely to add incremental value when monetary compensation is offered.

In contrast, when firms choose not to offer monetary compensation (e.g., due to financial constraints), customers lack a strong, outcome-based cue to anchor their judgments of justice. Under these conditions, voice anthropomorphism becomes more salient and diagnostic (Feldman & Lynch, 1988; Herr et al., 1991). An anthropomorphic voice conveying positive interpersonal qualities is therefore more likely to enhance customer evaluations, whereas non-anthropomorphic voices may appear more mechanical and, consequently, less empathic and caring (Longoni et al., 2019). Accordingly, we expect that an anthropomorphic (vs. non-anthropomorphic) voice positively influences attitude toward the brand and customer satisfaction with the service robot, but only in the absence of monetary compensation.

H2: Anthropomorphic voice (vs. non-anthropomorphic voice) moderates the effect of monetary compensation (vs. no monetary compensation) on attitude toward the brand and customer satisfaction with the service robot. Voice has no effect when monetary compensation is provided. However, in the absence of monetary compensation, customers evaluate an anthropomorphic voice more positively than a non-anthropomorphic voice.

In line with our conceptualization of service recovery as social support, we argue that customer-perceived social support explains the interaction effect predicted in H2. Social support refers to the extent to which interactions are evaluated as supportive and helpful in coping with stressful situations (Lazarus & Folkman, 1984). In the context of service recovery, social support comprises instrumental (e.g., monetary compensation), emotional (e.g., apology), and informational (e.g., explanation) recovery strategies, each of which facilitates customers' ability to cope with a service failure (Gelbrich, 2010) and can also be provided by non-human agents such as service robots (Chang et al., 2023; Gao et al., 2025; Gelbrich et al., 2021). Just as social support strategies and service recovery strategies are typically introduced after the service failure (i.e., after the initial appraisal of the situation), we conceptualize them as coping resources in line with social support and coping theory (e.g., Lazarus & Folkman, 1984) and service failure research (e.g., Gabbott et al., 2010; Kaur et al., 2022; Sengupta et al., 2015; Strizhakova et al., 2012).

Monetary compensation constitutes a strong form of instrumental support and simultaneously serves as a salient cue of distributive justice (Gelbrich & Roschk, 2011; Orsingher et al., 2010), thereby leading to high levels of perceived social support. When such a strong, outcome-based cue is present, perceived social support is already strongly



**Fig. 1.** Conceptual framework on the effects of monetary compensation and service robot voice on attitude toward the brand and customer satisfaction with the service robot. Source: Own depiction.

elevated, leaving little room for additional interpersonal cues, such as voice anthropomorphism, to further influence customers' evaluations. In contrast, when monetary compensation is not provided, customers lack a strong, tangible source of support. Under these conditions, anthropomorphic (vs. non-anthropomorphic) voice becomes more influential (Feldman & Lynch, 1988; Herr et al., 1991). It conveys interpersonal qualities such as empathy, care, and a human touch (Choi et al., 2021), thereby providing emotional support that increases perceived social support. Higher levels of perceived social support, in turn, positively affect customer outcomes, including attitude toward the brand and customer satisfaction with the service robot (Gelbrich & Roschk, 2011; Gong et al., 2013). Taken together, we argue that customer-perceived social support serves as a mechanism through which service recovery strategies and robot voice jointly influence outcomes (i. e., the predicted interaction in H2).

H3: The effect of monetary compensation (vs. no monetary compensation) on customer satisfaction with the service robot moderated by anthropomorphic voice (vs. non-anthropomorphic voice) is mediated by perceived social support.

### 2.5. Overview of studies

We investigate the effects of monetary compensation (vs. no monetary compensation) and of anthropomorphic (vs. non-anthropomorphic) service robot voice across five studies. Across our studies, we follow the logic of conceptual replications to establish the robustness and generalizability of our findings by systematically varying presumed irrelevant factors while testing our core predictions (Schmidt, 2009; John et al., 2015). These factors include the amount of monetary compensation, the service robot's voice gender, and its physical appearance. Study 1 demonstrates the predicted main effect of monetary compensation (H1a) and the interaction effect (H2) between monetary compensation and anthropomorphic voice on attitude toward the brand. Study 2a conceptually replicates these effects, reinforcing their robustness. In Studies 2b and 2c, we test the assumed dominance of auditory over visual cues (e.g., Kraus, 2017; Lewis et al., 2012), which initially led us to treat robot appearance as irrelevant. Accordingly, in Study 2b, we replace anthropomorphic voice with anthropomorphic appearance to examine whether visual anthropomorphism produces similar effects. The results show that physical appearance does not interact with monetary compensation (as anthropomorphic voice does), providing evidence for the unique role of voice-based anthropomorphism. Study 2c further examines the assumed dominance of auditory over visual cues by incorporating both voice and appearance in the experimental design, replicating the simple effect of voice in the no monetary compensation condition, while finding no effect of appearance. Finally, Study 3

replicates the focal interaction effect and identifies customer-perceived social support as the underlying mechanism. In addition, Study 3 demonstrates that the effects extend to customer satisfaction with the service robot as the dependent variable.

Before our studies, we calculated the necessary sample sizes. We suspected that the effect size ranges from small to medium. Respective GPower calculations yielded a required sample size ranging from 128 to 199 participants. Accordingly, the achieved sample size exceeded the minimum required sample size of 128 participants in all our studies.

## 3. Study 1

In Study 1, we test the effect of monetary compensation (H1a) and the focal interaction between monetary compensation and voice (H2). We examine the respective effects on attitude toward the brand in a restaurant because it serves as a prototypical setting for service failure studies in marketing research (Arikan et al., 2023; Choi et al., 2021), service failures and recovery are common in this industry (Hoffman et al., 1995), and restaurants increasingly rely on service robots (Jones, 2023; Sahota, 2024), which makes the setting more realistic.

### 3.1. Participants and procedure

We conducted a 2 (monetary compensation vs. no monetary compensation)  $\times$  2 (voice: anthropomorphic vs. non-anthropomorphic) randomized between-subjects online experiment with a sample of 201 participants from a large customer panel in the US. No cases were excluded from the analysis. Participants averaged 36.54 years ( $SD = 10.24$ ; 55.72% were female, 43.78% were male, 0.5% were diverse). None of the participants reported suffering from hearing problems. Cell sizes ranged from 46 to 56.

In the experiment, participants had to imagine going out to dinner at a restaurant (see Appendix A). They were then shown a picture of a service robot (see Appendix B). We used picture stimuli as they are frequently employed in service research (Keh et al., 2013; Lechner & Paul, 2019) and are ecologically valid (Bateson & Hui, 1992). We chose service robots similar to those employed in research (Choi et al., 2021) and practice (BBC News, 2020).

We led participants through the scenario using text instructions and recordings of an anthropomorphic (vs. non-anthropomorphic) voice. In the scenario, we described a service failure in which the service robot brings the wrong dish, which is a common way of manipulating service failure in marketing research (Choi et al., 2021). Afterward, we asked participants to complete the survey, including our dependent variable and demographic information.

3.2. Experimental manipulations

The manipulations of monetary compensation (vs. no monetary compensation) as instrumental social support were part of the scenarios (see Appendix A). To rule out the effects of other support strategies, we kept them at a high level. In the scenario, the service robot apologized for the service failure (emotional support), explained the failure by stating that its voice recognition does not always work perfectly (informational support), and finally brought the correct dish. In the monetary compensation condition, customers additionally received monetary compensation in the form of a 40% discount on the bill. We selected this level of discount because it can be considered moderate to generous, as it falls between the modest (e.g., 20%) and excellent (100%) recovery efforts described in prior research (Wirtz & Mattila, 2004; Hess et al., 2003).

For the manipulation of voice, we worked with a professional female voice actor. Existing research shows that voice actors can manipulate their voice according to respective instructions (Wang et al., 2021). We used the same voice actor for the anthropomorphic and non-anthropomorphic service robot voice manipulations (rather than a human voice and a synthetic voice), because we know that voices are idiosyncratic and that changing the voice itself could introduce confounds in our effects (Kreiman & Diana Sidtis, 2011). For the anthropomorphic voice, we asked the professional voice actor to speak naturally and conversationally, whereas for the non-anthropomorphic voice, we asked the professional voice actor to speak artificially, as if the voice was synthetically produced. The recordings can be found on Soundcloud (<https://on.soundcloud.com/Ao4MTBYJiyE1Vt47>).

3.3. Measures and manipulation checks

We measured all items on seven-point Likert scales, with higher values indicating stronger agreement (see Table 2 for the descriptive statistics across all our studies and Appendix C for all scales and items). Attitude toward the brand was measured using items adapted from Hagtvedt (2011; alpha = 0.94). For the monetary compensation manipulation check, we asked participants to indicate whether they received monetary compensation for the mistake of the service robot in the form of a 40% discount on the bill (answers: yes, no). Participants correctly recalled the monetary compensation ( $\chi^2(1) = 102.12, p < 0.05$ ). To assess whether the service robot voice was perceived as non-

**Table 2**  
Descriptive statistics, reliabilities, and correlations in studies 1–3.

	M	SD	Cronbach's alpha	Correlations		
				1	2	3
<i>Study 1</i>						
Attitude toward the brand	4.68	1.40	0.94			
<i>Study 2a</i>						
Attitude toward the brand	4.36	1.48	0.97			
<i>Study 2b</i>						
Attitude toward the brand	5.20	1.42	0.97			
<i>Study 2c</i>						
Attitude toward the brand	5.07	1.45	0.97			
<i>Study 3</i>						
1 Customer satisfaction with the service robot	4.01	1.82	0.95			
2 Customer-perceived social support	4.16	1.55	0.80	0.77		
3 Eeriness	3.66	1.79	0.88	-0.22	-0.11	
4 Uniqueness neglect	4.14	1.69	0.89	-0.20	-0.20	0.39

Source: Own depiction.

anthropomorphic, we used items focusing on the sound of the voice (alpha = 0.90). Participants in the anthropomorphic voice condition reported significantly lower perceptions of voice artificiality (anthropomorphic voice condition: M = 4.42, SD = 1.65; non-anthropomorphic voice condition: M = 5.47, SD = 1.62; T(199) = 4.54, p < 0.05). Both manipulations were unconfounded with each other (all ps > 0.05). Additionally, we measured one item on the realism of the scenario and one item on the fit of the voice. Neither manipulation affected the respective items (all ps > 0.05).

3.4. Results

We tested our hypotheses using a two-way analysis of variance. Consistent with H1a, the main effect of monetary compensation on attitude toward the brand was significant (F(1,197) = 6.27, p < 0.05,  $\eta^2 = 0.03$ ), and participants reported a more favorable attitude toward the brand in the monetary compensation condition (M = 4.91, SD = 1.37) than in the no monetary compensation condition (M = 4.43, SD = 1.38). The main effect of service robot voice, for which we did not formulate a hypothesis, was not significant (F(1,197) = 1.23, ns,  $\eta^2 = 0.01$ ). Attitude toward the brand did not differ between the non-anthropomorphic voice condition (M = 4.60, SD = 1.53) and the anthropomorphic voice condition (M = 4.77, SD = 1.24).

In support of H2, the two-way interaction effect of monetary compensation and service robot voice on attitude toward the brand was significant (F(1,197) = 4.57, p < 0.05,  $\eta^2 = 0.02$ ). The expected effect pattern was also reflected in the pairwise comparisons (see Fig. 2). The anthropomorphic voice had a significant positive simple effect (F(1,197) = 5.04, p < 0.05,  $\eta^2 = 0.03$ ) in the no monetary compensation condition (non-anthropomorphic voice: M = 4.10, SD = 1.55; anthropomorphic voice: M = 4.73, SD = 1.15), whereas the simple effect was not significant (F(1,197) = 0.55, ns,  $\eta^2 = 0.00$ ) in the monetary compensation condition (non-anthropomorphic voice: M = 5.00, SD = 1.40; anthropomorphic voice: M = 4.80, SD = 1.35). We concluded that our data support H1a and H2.

3.5. Discussion

Study 1 shows the effect of monetary compensation on attitude toward the brand and demonstrates that an anthropomorphic (vs. non-anthropomorphic) voice improves attitude toward the brand when firms choose not to offer monetary compensation. However, when firms offer monetary compensation, voice does not affect attitude toward the brand. Overall, the findings suggest that non-physical design features like voice can serve as important cues in service recovery.

4. Studies 2a-c

Studies 2a, 2b, and 2c replicated the effects observed in Study 1 and demonstrated the dominant role of anthropomorphic voice over anthropomorphic appearance. The studies follow the idea of conceptual replications (Schmidt, 2009; John et al., 2015) by varying several presumed irrelevant factors while consistently showing our hypothesized effects. Study 2a conceptually replicates Study 1 entirely. Studies 2b and 2c seek to replicate some of the effects of Study 1 and to examine the role of voice-based versus appearance-based anthropomorphism.

4.1. Study 2a

Study 2a was designed to replicate the findings of Study 1. Additionally, we added to the generalizability of our findings by varying presumed irrelevant factors (Schmidt, 2009; John et al., 2015). We employed a different service robot, a male service robot voice instead of a female one, and a lower monetary compensation in the respective condition.

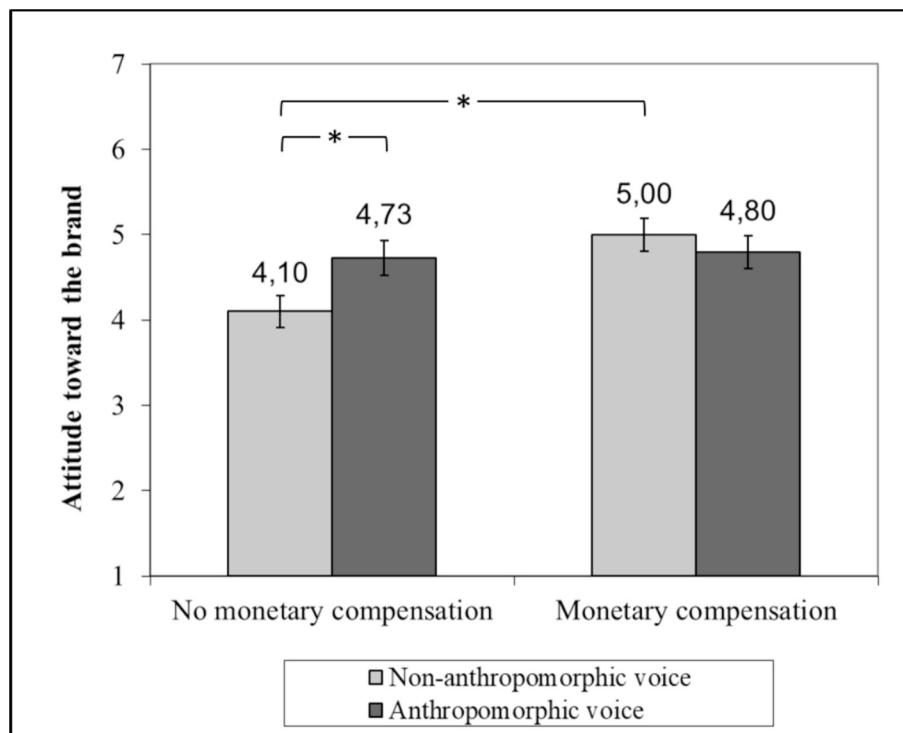


Fig. 2. Effects of monetary compensation and service robot voice on attitude toward the brand in Study 1 Note: Error bars =  $\pm 1$  standard error. \*  $p < 0.05$ . Source: Own depiction.

#### 4.1.1. Participants and procedure

We conducted a 2 (monetary compensation vs. no monetary compensation)  $\times$  2 (voice: anthropomorphic vs. non-anthropomorphic) randomized between-subjects online experiment with a sample of 189 participants from a large customer panel in the US. No cases were excluded from the analysis. Participants averaged 44.96 years ( $SD = 15.84$ ; 61.90% were female, 35.45% were male, 2.65% were diverse). None of the participants reported suffering from hearing problems. Cell sizes ranged from 46 to 49. The scenario was similar to Study 1 (see Appendix A), but we used a picture of a different service robot (see Appendix B).

#### 4.1.2. Experimental manipulations

The manipulation of monetary compensation (vs. no monetary compensation) as an instrumental form of social support was part of the scenarios (see Appendix A). To rule out the effects of other support strategies, we kept them constant again. In the scenario, the service robot apologized (i.e., emotional support), explained the service failure (i.e., informational support), and brought the correct dish. We treated the level of monetary compensation and voice gender as presumed irrelevant factors (Schmidt, 2009; John et al., 2015). In the monetary compensation condition, customers also received monetary compensation in the form of a 35% discount on the bill (compared with 40% in Study 1). We selected this level of discount because it can still be considered moderate to generous (cf. Wirtz & Mattila, 2004; Hess et al., 2003). However, we avoided using the same numbers to show that they do not affect the hypothesized effects (cf. Sokolova et al., 2020). For the manipulation of service robot voice, we again worked with a professional voice actor. Instead of a female voice actor, as in Study 1, we used a male voice actor, as voice gender may generally affect customer perceptions (cf. Whipple & McManamon, 2002). The recordings can be found on Soundcloud (<https://on.soundcloud.com/SL78J87ZHBLSgcgKM9>).

#### 4.1.3. Measures and manipulation checks

We measured all items on seven-point Likert scales with higher values indicating stronger agreement. Attitude toward the brand was measured as in Study 1 ( $\alpha = 0.97$ ; see Appendix C for all scales and items). For the monetary compensation manipulation check, we asked participants to indicate whether they received monetary compensation for the service robot's mistake in the form of a 35% discount on the bill (answers: yes, no). Participants correctly recalled the monetary compensation ( $\chi^2(1) = 177.21, p < 0.05$ ). To assess whether the service robot voice was perceived as non-anthropomorphic or anthropomorphic, we used the same items as in Study 1 ( $\alpha = 0.94$ ). Participants in the non-anthropomorphic voice condition reported significantly higher perceptions of voice artificiality (non-anthropomorphic voice condition:  $M = 6.04, SD = 1.22$ ; anthropomorphic voice condition:  $M = 3.65, SD = 1.65$ ;  $T(187) = 11.33, p < 0.05$ ). Both manipulations were unconfounded with each other (all  $ps > 0.05$ ). Additionally, we again measured the same items regarding the scenario's realism and the voice's fit, as in Study 1. Both manipulations did not affect the respective items (all  $ps > 0.05$ ).

#### 4.1.4. Results

We tested our hypotheses using a two-way analysis of variance. In support of H1a, the main effect of monetary compensation on attitude toward the brand was significant ( $F(1,185) = 9.87, p < 0.05, \eta^2 = 0.05$ ). Participants reported a more favorable attitude toward the brand in the monetary compensation condition ( $M = 4.68, SD = 1.47$ ) than in the no monetary compensation condition ( $M = 4.03, SD = 1.43$ ). Also, the main effect of service robot voice, for which we did not formulate a hypothesis, was significant ( $F(1,185) = 7.72, p < 0.05, \eta^2 = 0.04$ ). Participants reported a more favorable attitude toward the brand in the anthropomorphic voice condition ( $M = 4.64, SD = 1.45$ ) than in the non-anthropomorphic voice condition ( $M = 4.07, SD = 1.47$ ).

In support of H2, the two-way interaction effect of monetary compensation and service robot voice on attitude toward the brand was significant ( $F(1,185) = 4.22, p < 0.05, \eta^2 = 0.02$ ). The expected effect

pattern was also reflected in the pairwise comparisons (see Fig. 3). In line with H2, the anthropomorphic (vs. non-anthropomorphic) voice had a significant positive simple effect on attitude toward the brand in the no monetary compensation condition ( $F(1, 185) = 11.50, p < 0.05, \eta^2 = 0.06$ ). Participants reported a more favorable attitude toward the brand in the anthropomorphic voice condition ( $M = 4.53, SD = 1.26$ ) than in the non-anthropomorphic voice condition ( $M = 3.53, SD = 1.43$ ). Consistent with H2, the anthropomorphic (vs. non-anthropomorphic) voice had no significant simple effect in the monetary compensation condition ( $F(1, 185) = 0.27, ns, \eta^2 = 0.00$ ). Attitude toward the brand did not differ between the non-anthropomorphic ( $M = 4.60, SD = 1.32$ ) and anthropomorphic voice conditions ( $M = 4.75, SD = 1.61$ ). We concluded that our data support H1a and H2.

4.2. Study 2b

After replicating the focal interaction in Study 2a, we tested our assumption that anthropomorphic voice plays a more important role in influencing recovery effectiveness than anthropomorphic appearance in Study 2b. We examined whether anthropomorphic appearance elicits the same interaction effect as observed for anthropomorphic voice (H2). To do so, we used a design similar to that of both prior studies, replacing the anthropomorphic voice with anthropomorphic appearance as the moderator of monetary compensation.

4.2.1. Participants and procedure

We conducted a 2 (monetary compensation vs. no monetary compensation)  $\times$  2 (appearance: anthropomorphic vs. non-anthropomorphic) randomized between-subjects online experiment. The sample consisted of 139 participants from a large customer panel in the US. No cases were excluded from the analysis. Participants averaged 34.41 years ( $SD = 12.43$ ; 55.40% were female, 43.88% were male, 0.72% were diverse). None of the participants reported suffering from hearing problems. Cell sizes ranged from 32 to 41. The scenario was similar to Study 1 (see Appendix A). We also used the same picture of a

service robot as in Study 1 (see Appendix B).

4.2.2. Experimental manipulations

In this study, we did not use voice recordings, as the goal was to replace voice-based anthropomorphism with that based on physical appearance. We provided the respective text, as recorded by a professional voice actor in Study 1, for participants to read. We manipulated anthropomorphism based on robot appearance (see Appendix B). The anthropomorphic service robot had a head, arms, and legs, whereas the non-anthropomorphic service robot did not. The monetary compensation condition included a 25% discount reflecting a rather moderate discount level (cf. Wirtz & Mattila, 2004; Hess et al., 2003) to increase the likelihood that appearance affects outcomes (i.e., to make the test of our assumption that voice dominates harder) and to further demonstrate that the discount numbers do not affect the hypothesized effects (cf. Sokolova et al., 2020).

4.2.3. Measures and manipulation checks

Attitude toward the brand was measured using the same items as in prior studies ( $\alpha = 0.97$ ). For the service recovery manipulation check, we asked participants to indicate whether they received compensation for the mistake of the service robot in the form of a 25% discount on the bill (answers: yes, no). Participants correctly recalled the monetary compensation ( $\chi^2(1) = 116.05, p < 0.05$ ). For the robot appearance manipulation check, we asked participants to indicate the degree to which the robot looks like a person, looks like a human, has a body like a human (with arms, head, and legs), and looks like a machine (reverse coded;  $\alpha = 0.83$ ). Participants in the anthropomorphic appearance condition reported significantly higher perceptions of anthropomorphism (anthropomorphic appearance:  $M = 3.57, SD = 1.41$ ; non-anthropomorphic appearance:  $M = 2.31, SD = 1.21$ ;  $T(136) = 5.60, p < 0.05$ ). Both manipulations were unconfounded with each other (all  $ps > 0.05$ ).

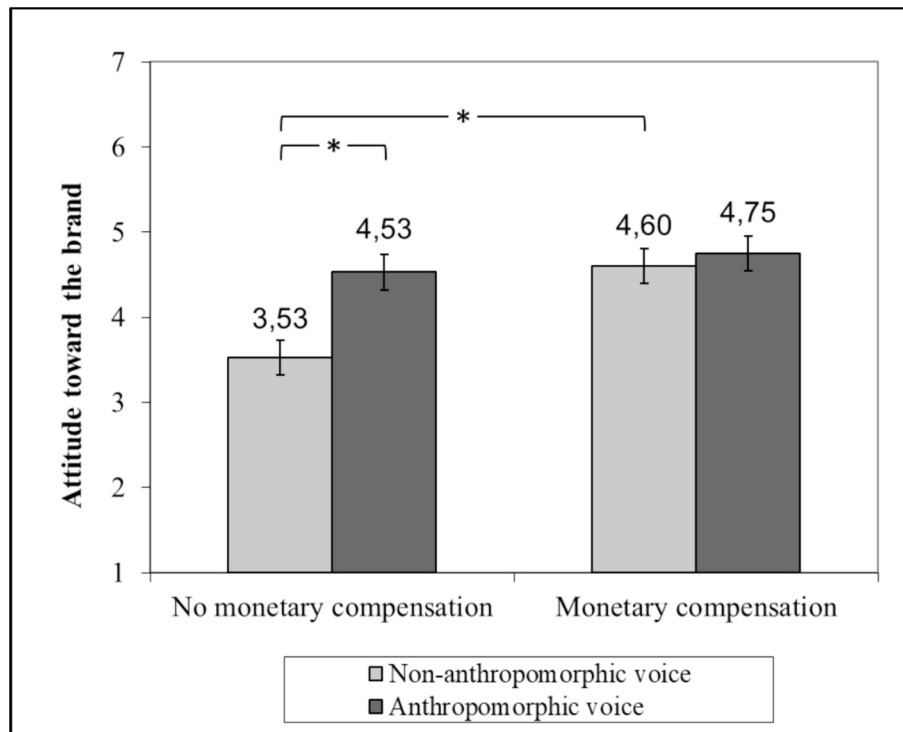


Fig. 3. Effects of monetary compensation and service robot voice on attitude toward the brand in Study 2a Note: Error bars =  $\pm 1$  standard error. \*  $p < 0.05$ . Source: Own depiction.

#### 4.2.4. Results

We tested the effects using a two-way analysis of variance. In line with H1, the main effect of monetary compensation on attitude toward the brand was significant ( $F(1,135) = 9.17, p < 0.05, \eta^2 = 0.06$ ). As predicted, participants reported a more positive attitude toward the brand in the monetary compensation condition ( $M = 5.54, SD = 1.28$ ) than in the no monetary compensation condition ( $M = 4.84, SD = 1.49$ ). Consistent with our theoretical reasoning, the main effect of service robot appearance was not significant ( $F(1,135) = 0.03, ns, \eta^2 = 0.00$ ). Attitude toward the brand did not differ between the non-anthropomorphic ( $M = 5.22, SD = 1.50$ ) and the anthropomorphic appearance conditions ( $M = 5.20, SD = 1.35$ ).

In line with our argumentation, the two-way interaction effect of monetary compensation and robot appearance on attitude toward the brand was not significant ( $F(1,135) = 1.55, ns, \eta^2 = 0.01$ ). The simple effect of appearance did not differ between the no monetary compensation condition (non-anthropomorphic appearance:  $M = 4.72, SD = 1.71$ ; anthropomorphic appearance:  $M = 4.97, SD = 1.23$ ) and the monetary compensation condition (non-anthropomorphic appearance:  $M = 5.73, SD = 1.04$ ; anthropomorphic appearance:  $M = 5.39, SD = 1.43$ ). We conclude that an anthropomorphic appearance does not produce the same effects as an anthropomorphic voice in a comparable setting.

### 4.3. Study 2c

Study 2c sought to replicate the simple effect of anthropomorphic voice in the no monetary compensation condition, as predicted in H2. In addition, we again tested the assumption that anthropomorphic voice plays a more important role in influencing recovery effectiveness than anthropomorphic appearance. We examined whether anthropomorphic appearance moderates (i.e., strengthens or weakens) the effect of anthropomorphic voice. To do so, we used a design similar to that of both prior studies, focusing on the no monetary compensation condition and including anthropomorphic appearance as a potential moderator.

#### 4.3.1. Participants and procedure

We conducted a  $2$  (appearance: anthropomorphic vs. non-anthropomorphic)  $\times 2$  (voice: anthropomorphic vs. non-anthropomorphic) randomized between-subjects online experiment. The sample consisted of 200 participants from a large customer panel in the US. No cases were excluded from the analysis. Participants averaged 34.84 years ( $SD = 12.45$ ; 60.00% were female, 39.00% were male, 1.00% were diverse). None of the participants reported suffering from hearing problems. Cell sizes ranged from 48 to 52. The scenario was similar to those used in prior studies (see Appendix A).

#### 4.3.2. Experimental manipulations

We manipulated anthropomorphism based on appearance and voice. The anthropomorphic service robot had a head, face, arms, and legs, whereas the non-anthropomorphic service robot did not (see Appendix B). Service robot voice was manipulated using the male voice actor manipulations from Study 2a.

#### 4.3.3. Measures and manipulation checks

Attitude toward the brand was measured using the same items as in prior studies ( $\alpha = 0.97$ ). We used the same voice manipulation check as in prior studies ( $\alpha = 0.89$ ) and find that the manipulation was successful (non-anthropomorphic voice:  $M = 5.30, SD = 1.42$ ; anthropomorphic voice:  $M = 4.38, SD = 1.65$ ;  $T(198) = 4.22, p < 0.05$ ). For the appearance manipulation check, we used the same items as in Study 2b ( $\alpha = 0.80$ ) and find that the manipulation was successful (anthropomorphic appearance:  $M = 3.10, SD = 1.28$ ; non-anthropomorphic appearance:  $M = 2.50, SD = 1.52$ ;  $T(198) = 2.99, p < 0.05$ ). Both manipulations were unconfounded with each other (all  $ps > 0.05$ ).

#### 4.3.4. Results

We tested the effects using a two-way analysis of variance. In line with H2, the main effect of voice on attitude toward the brand was significant ( $F(1, 196) = 4.67, p < 0.05, \eta^2 = 0.02$ ), consistent with the predicted simple effect of voice in the no monetary compensation condition. Participants reported a more favorable attitude toward the brand in the anthropomorphic voice condition ( $M = 5.30, SD = 1.36$ ) than in the non-anthropomorphic voice condition ( $M = 4.86, SD = 1.52$ ). Consistent with our argumentation, but not formally hypothesized, no significant main effect of appearance was observed ( $F(1,196) = 0.46, ns, \eta^2 = 0.00$ ). Attitude toward the brand did not differ between the non-anthropomorphic ( $M = 5.00, SD = 1.54$ ) and anthropomorphic appearance conditions ( $M = 5.14, SD = 1.37$ ).

Consistent with our theoretical reasoning, there was no significant interaction between voice and appearance on attitude toward the brand ( $F(1,196) = 0.11, ns, \eta^2 = 0.00$ ). The simple effect of voice did not differ between the non-anthropomorphic appearance (non-anthropomorphic voice:  $M = 4.75, SD = 1.71$ ; anthropomorphic voice:  $M = 5.26, SD = 1.32$ ) and the anthropomorphic appearance condition (non-anthropomorphic voice:  $M = 4.96, SD = 1.32$ ; anthropomorphic voice:  $M = 5.33, SD = 1.41$ ). We conclude that we were able to replicate the simple effect of voice in the no monetary compensation condition (H2), while controlling for appearance, indicating no interaction between voice and appearance. This indicates that an anthropomorphic appearance does not influence the effect of an anthropomorphic voice (e.g., no matching effect). Moreover, appearance (other than voice) does not exert an effect on the dependent variable. This may be due to the special role of voice in human interactions (cf. Kraus, 2017; Lewis et al., 2012).

### 4.4. Discussion

In Studies 2a-b, we focused on replicating the findings from Study 1 and on demonstrating the dominant role of anthropomorphic voice over anthropomorphic appearance. Study 2a replicated the effects shown in Study 1 across varied conditions. We extended the generalizability of our findings by showing that the hypothesized main effect of monetary compensation and the interaction effect hold across varied conditions (i.e., different service robots, male service robot voice, and different monetary compensation levels). In Study 2b, we used a design similar to that of the prior studies but manipulated anthropomorphism through appearance rather than voice. With this study, we replicated the main effect of monetary compensation, showing that anthropomorphic appearance does not elicit effects comparable to those of anthropomorphic voice. In Study 2c, we focused on the no monetary compensation condition and manipulated both voice anthropomorphism and appearance anthropomorphism. We replicated the simple effect of voice in the no monetary compensation condition and showed that anthropomorphic appearance does not moderate the effect of anthropomorphic voice. Overall, we were able to replicate our findings supporting H1a and H2, showing that voice appears to be more relevant in service failure and recovery contexts than appearance.

## 5. Study 3

### 5.1. Participants and procedure

Study 3 was aimed at showing the underlying mechanism of the focal interaction. Specifically, we expected that customer-perceived social support would mediate the interaction effect between monetary compensation and service robot voice on customer satisfaction with the service robot (H3). Additionally, we ruled out eeriness and uniqueness neglect as alternative accounts. Research shows that service robots elicit a sense of eeriness when perceived as very human-like (but not completely human-like), which, in turn, can negatively impact marketing outcomes (Mende et al., 2019). Uniqueness neglect is associated with service providers' use of artificial intelligence (Longoni et al.,

2019). Both variables have been shown to explain the effects associated with service robots (Longoni et al., 2019; Mende et al., 2019) and may serve as alternative mediators in our model. In addition to showing the mechanism of the focal interaction and ruling out competing mediators, we again replicated the findings of our prior studies and showed that the respective effects hold for a different service outcome (i.e., customer satisfaction with the service robot).

We conducted a 2 (monetary compensation vs. no monetary compensation) by 2 (voice: anthropomorphic vs. non-anthropomorphic) randomized between-subjects online experiment with a sample of 158 participants from a large customer panel in the US. No cases were excluded from the analysis. Participants averaged 36.95 years ( $SD = 8.37$ ; 64.56% were female, 34.81% were male, 0.63% were diverse). None of the participants reported suffering from hearing problems. Cell sizes ranged from 36 to 44. The scenario was similar to Study 1 (see Appendix A). We used the same picture of a service robot as in Study 1 (see Appendix B).

### 5.2. Experimental manipulations

Monetary compensation was manipulated as in Study 2a (35 percent price discount; see Appendix A). Also, for the manipulation of service robot voice, we used the same recordings of a professional male voice actor as in prior studies.

A pretest ( $N = 50$ ) used the same design as in the subsequent study. Participants indicated that the robot was capable of social interaction ( $M = 4.46$ ), had social qualities ( $M = 4.28$ ), conveyed a sense of social presence ( $M = 3.90$ ), and was perceived as a social actor ( $M = 3.40$ ). All items were measured on seven-point Likert scales with higher values indicating stronger agreement. These values around the scale midpoint are consistent with the notion that the robot was perceived as a social actor, supporting the assumption underlying our proposed mechanism.

### 5.3. Measures and manipulation checks

All scales were measured on seven-point Likert scales. We measured customer satisfaction with the service robot using items adapted from Brady et al. (2005;  $\alpha = 0.95$ ; see Appendix C for all scales and items). We measured customer-perceived social support using three items from the Multidimensional Scale of Perceived Social Support (MSPSS; Zimet et al., 1988;  $\alpha = 0.80$ ). The MSPSS assesses perceived social support (Lazarus & Folkman, 1984; Zimet et al., 1988). It has been widely used across disciplines (Turner, 1999; Yeo et al., 2025) and successfully adapted in prior marketing research to measure source-specific social support (e.g., Tan et al., 2023; Xu et al., 2014). In the context of our study, we refer to social support provided by the service robot (not to perceptions of general social support from family and friends, which may differ among customers), so our items focused on the robot as the reference object. Additionally, we measured eeriness ( $\alpha = 0.88$ ; Mende et al., 2019) and uniqueness neglect ( $\alpha = 0.89$ ; Longoni et al., 2019) as possible alternative accounts. Our model variables showed acceptable levels of reliability, convergent validity (all AVEs  $> 0.5$ ), and discriminant validity (all AVEs  $>$  all squared correlations; Fornell & Larcker, 1981).

We used the same manipulation checks for monetary compensation as in Study 2. Participants correctly recalled the monetary compensation ( $\chi^2(1) = 93.33, p < 0.05$ ). For the voice manipulation check, we used the same items as in all prior studies ( $\alpha = 0.91$ ) and find that the manipulation was successful (non-anthropomorphic voice condition:  $M = 5.68, SD = 1.33$ ; anthropomorphic voice condition:  $M = 3.86, SD = 1.85$ ;  $T(156) = 7.11, p < 0.05$ ). Both manipulations were unconfounded with each other (all  $ps > 0.05$ ). Additionally, we again measured the same items regarding the scenario's realism and the voice's fit, as in prior studies. Neither manipulation affected the respective items (all  $ps > 0.05$ ).

### 5.4. Results

We tested H1b and H2 using a two-way analysis of variance. The hypothesized main effect (H1b) of monetary compensation ( $F(1,154) = 10.75, p < 0.05, \eta^2 = 0.07$ ) and the main effect of service robot voice ( $F(1,154) = 4.31, p < 0.05, \eta^2 = 0.03$ ), for which we did not formulate a hypothesis, on customer satisfaction with the service robot were significant. Customer satisfaction with the service robot was higher in the monetary compensation condition ( $M = 4.46, SD = 1.60$ ) than in the no monetary compensation condition ( $M = 3.59, SD = 1.92$ ). Also, customer satisfaction with the service robot was higher in the anthropomorphic voice condition ( $M = 4.28, SD = 1.84$ ) than in the non-anthropomorphic voice condition ( $M = 3.74, SD = 1.77$ ). We did not hypothesize this effect. In support of H2, the two-way interaction effect of monetary compensation and service robot voice on customer satisfaction with the service robot was significant ( $F(1,154) = 5.22, p < 0.05, \eta^2 = 0.03$ ). The expected pattern was also reflected in the pairwise comparisons (see Fig. 4). We found that the anthropomorphic (vs. non-anthropomorphic) voice showed a significant positive simple effect on customer satisfaction with the service robot in the no monetary compensation condition ( $F(1, 154) = 9.87, p < 0.05, \eta^2 = 0.06$ ). Participants reported higher customer satisfaction with the service robot in the anthropomorphic voice condition ( $M = 4.15, SD = 1.95$ ) than in the non-anthropomorphic voice condition ( $M = 2.95, SD = 1.70$ ). The simple effect of anthropomorphic (vs. non-anthropomorphic) voice in the monetary compensation condition was not significant ( $F(1,154) = 0.02, ns, \eta^2 = 0.00$ ). There was no significant difference between the non-anthropomorphic ( $M = 4.48, SD = 1.52$ ) and anthropomorphic voice conditions ( $M = 4.43, SD = 1.70$ ).

To test the underlying mechanism linking monetary compensation and service robot voice to customer satisfaction with the service robot through customer-perceived social support (H3), we used bootstrapping in the Process macro for SPSS (Model 8; 10,000 samples; Hayes, 2022). In line with H3, we found a significant interaction effect of monetary compensation and service robot voice on perceived social support ( $\beta = 0.22, SE = 0.11, p < 0.05; \Delta R^2 = 0.02$ ; see Table 3). There was a positive effect of the anthropomorphic (vs. non-anthropomorphic) voice when no monetary compensation was provided ( $\beta = -0.45, SE = 0.16, p < 0.05$ ) and no effect when monetary compensation was provided ( $\beta = 0.00, SE = 0.16, ns$ ). Social support exerted a significant positive effect on customer satisfaction with the service robot ( $\beta = 0.90, SE = 0.07, p < 0.05$ ). In line with H3, we found a significant index of mediated moderation (index = 0.41,  $SE = 0.20, 95\% CI [0.01, 0.80]$ ). There was a positive indirect effect of the anthropomorphic (vs. non-anthropomorphic) voice on customer satisfaction with the service robot when no monetary compensation was provided ( $\beta = -0.41, SE = 0.16, 95\% CI [-0.72, -0.09]$ ), whereas the indirect effect was not significant when monetary compensation was provided ( $\beta = -0.00, SE = 0.12, 95\% CI [-0.24, 0.23]$ ).

To rule out alternative accounts for customer-perceived social support, we ran the same analysis again with eeriness and uniqueness neglect as mediators. We did not find a significant interaction between monetary compensation and service robot voice predicting eeriness ( $\beta = -0.04, SE = 0.14, p = 0.77$ ) or uniqueness neglect ( $\beta = -0.02, SE = 0.13, p = 0.86$ ). Also, there was no significant difference in the conditional indirect effects of voice on customer satisfaction with the service robot through eeriness (index = 0.01,  $SE = 0.05, 95\% CI [-0.09, 0.13]$ ) or uniqueness neglect (index = 0.01,  $SE = 0.04, 95\% CI [-0.07, 0.10]$ ), suggesting that these variables do not serve as alternative mediators.

### 5.5. Discussion

Study 3 extends prior results by identifying perceived social support as a mediating mechanism. Robot voice and monetary compensation jointly affect customer satisfaction through perceived social support. In addition, we demonstrated that the effects shown in prior studies hold

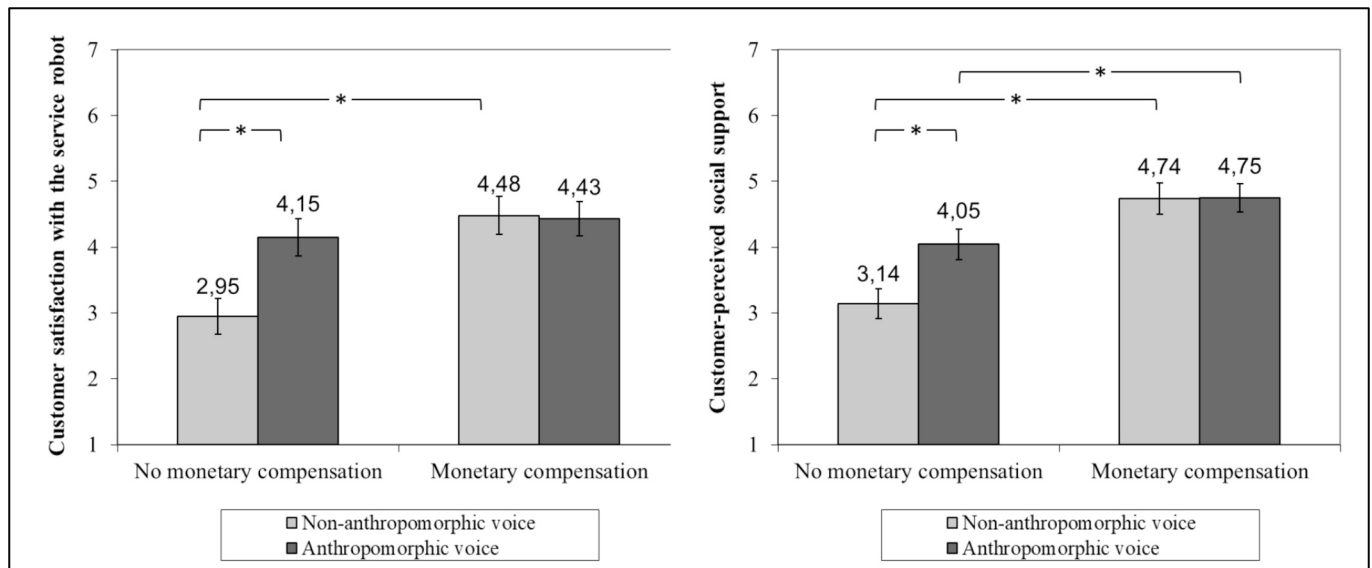


Fig. 4. Effects of monetary compensation and service robot voice on customer satisfaction with the service robot and customer-perceived social support in Study 3. Note: Error bars = ±1 standard error. \* p < 0.05. Source: Own depiction.

Table 3  
Regression results in Study 3.

	Customer-perceived social support (M)		Customer satisfaction with the service robot (Y)	
	Coeff. (SE)	95% CI	Coeff. (SE)	95% CI
Intercept	4.17* (0.11)	3.95, 4.39	0.24 (0.29)	-0.34, 0.81
Monetary compensation	0.58* (0.11)	0.35, 0.80	-0.07 (0.10)	-0.27, 0.13
Service robot voice	-0.23* (0.11)	-0.45, -0.00	-0.08 (0.09)	-0.27, 0.11
Monetary compensation x service robot voice	0.22* (0.11)	0.00, 0.45	0.11 (0.09)	-0.07, 0.30
Customer-perceived support	-	-	0.90* (0.07)	0.77, 1.03
	R <sup>2</sup> = 0.18		R <sup>2</sup> = 0.60	
	F(3,154) = 10.94, p < 0.05		F(4,153) = 57.48, p < 0.05	

Note: \* p < 0.05.  
Source: Own depiction.

for a different service outcome (i.e., customer satisfaction with the service robot) and rule out eeriness and uniqueness neglect as alternative mechanisms.

### 6. General discussion

Service robots are increasingly deployed in frontline service environments, yet they remain prone to failures (Liu et al., 2023), making effective recovery strategies essential. We show that when firms choose not to provide monetary compensation, an anthropomorphic voice (vs. a non-anthropomorphic voice) improves the outcomes of respective service interactions by conveying important interpersonal qualities (Choi et al., 2021). However, voice does not affect outcomes when monetary compensation is offered, as monetary compensation serves as a salient cue of distributive justice (Gelbrich & Roschk, 2011; Orsingher et al., 2010). In Study 1, we show the interaction effect of voice and monetary compensation on attitude toward the brand, a downstream marketing outcome. Studies 2a-c replicate these effects. In addition, Studies 2b and 2c underscore the unique role of the anthropomorphic voice relative to

an anthropomorphic appearance (Kraus, 2017; Lewis et al., 2012). In Study 3, we show that the focal interaction is mediated by customer-perceived social support (Lazarus & Folkman, 1984) while ruling out possible alternative accounts (i.e., eeriness and uniqueness neglect; Mende et al., 2019; Longoni et al., 2019). Also, we again replicate the findings of our prior studies and show that the effects hold for a different service outcome (i.e., customer satisfaction with the service robot). Across our studies, we varied several presumed irrelevant factors (Schmidt, 2009; John et al., 2015) while consistently showing our hypothesized effects, thereby demonstrating the robustness and generalizability of our findings. In sum, our studies support our hypotheses and the assumption that voice plays a crucial role in service recovery settings.

#### 6.1. Theoretical implications

The present research makes three theoretical contributions. First, we advance the literature on service robot failure and recovery. While prior studies have predominantly examined service robot design features (i.e., anthropomorphic cues) as antecedents of customer responses in the context of service failures (e.g., Cui et al., 2023; Ryoo et al., 2024), we are among the first to investigate how these design features interact with service recovery strategies. This interaction is relevant, as service recovery can be conceptualized as perceived social support, and social support does not depend solely on what recovery strategy is provided but also on how it is delivered (Gelbrich, 2010). Consequently, the robot's design (e.g., the degree of anthropomorphism) qualifies the effectiveness of service recovery by shaping whether and to what extent a recovery effort is perceived as supportive. Our findings show that anthropomorphic cues, such as an anthropomorphic voice, matter primarily when dominant outcome-based recovery efforts, such as monetary compensation, are absent. When compensation is present, it anchors customer evaluations and reduces the relative influence of anthropomorphic design. In contrast, when compensation is absent, an anthropomorphic voice positively shapes customer responses by signaling social support. These findings deepen our understanding of service recovery. Given our findings and the fact that prior research has primarily focused on anthropomorphism in service failure situations (e.g., Cheng 2022), future research should further examine the role of anthropomorphism in service recovery. It would be interesting to test whether the effects of service robot anthropomorphism in this context

differ across service robot design features and other contextual factors (e.g., the service industry). This is also consistent with explicit calls for research in this field (e.g., Choi et al., 2021; Mir et al., 2023; Park et al., 2023).

Second, we extend the literature on service robot anthropomorphism by examining a non-physical design feature (i.e., voice). While prior research on service robot failure and recovery has predominantly focused on physical design features to elicit anthropomorphic responses (e.g., Arikan et al., 2023; Cheng, 2022; Choi et al., 2021), our study is among the first to demonstrate that non-physical design features can meaningfully influence customer reactions in recovery contexts, particularly when monetary compensation is absent. Our findings extend the limited existing research on non-physical design features, such as that of Barone et al. (2024), who examined the linguistic framing of service robots, by showing that auditory cues may also play an important role in shaping customer responses. In fact, we demonstrate that voice-based anthropomorphism has a stronger effect on customer evaluations than physical design features. Overall, our results suggest that focusing solely on physical design features may provide an incomplete picture of how customers respond to service robots and may lead researchers to overlook potentially more effective non-physical design features. Non-physical features can shape service interaction outcomes and, as our findings show, may even have a stronger influence than physical design features. Consequently, we encourage future research to explore non-physical design features, such as voice, language style, or gestures, and their role in shaping customer outcomes in service failure contexts.

Third, our research highlights the importance of perceived social support in service recovery provided by service robots. We contribute to the literature by offering a new lens for understanding how service robot voice and recovery jointly influence customer evaluations. While prior research has predominantly focused on cognitive mediators (e.g., attribution, performance expectations; e.g., Arikan et al., 2023; Cheng, 2022), affective responses (e.g., anger, intimacy, forgiveness; e.g., Arikan et al., 2023; Park et al., 2023), and general social perceptions (e.g., agency, warmth, competence; e.g., Barone et al., 2024; Choi et al., 2021), we extend this work by introducing social support as a distinct social-relational mechanism, which has been shown to reflect an important dynamic of customer interactions with service robots (Steins et al., 2025). This concept captures the customer's subjective sense that the service recovery interaction was caring and empathetic. Perceived social support positively affects perceptions of justice and customer outcomes. Specifically, our findings show that both monetary compensation and an anthropomorphic voice can enhance social support, which, in turn, positively affects attitude toward the brand and customer satisfaction with the service robot. With our findings, we add a novel and meaningful perspective to existing frameworks on how customers process service robot recovery and voice.

## 6.2. Managerial implications

Our research provides important managerial implications. First, building on our findings, managers should carefully consider how they design service recovery in conjunction with service robot design features. When monetary compensation is not feasible or desirable, employing an anthropomorphic service robot voice can serve as an effective alternative to improve customer responses. However, when monetary compensation is consistently offered, investing in anthropomorphic voice design is unlikely to yield additional benefits and may lead to unnecessary costs. More broadly, our findings suggest that highly diagnostic recovery cues (e.g., monetary compensation) can dominate customers' evaluations and attenuate the impact of service robot design features. Accordingly, service robot design should not be managed independently of recovery policies, and vice versa. Instead, firms should deliberately align robot design choices with their recovery approach.

Second, companies should try to create customer perceptions of

social support by providing monetary compensation or using an anthropomorphic voice. Additionally, companies may use other non-physical design features to create perceptions of social support. For instance, companies can draw on research suggesting that service robots using a social-oriented (vs. task-oriented) language may signal social support, thereby improving customer evaluations, especially in demanding or high-stress situations (Kumar et al., 2022). In a similar vein, Becker et al. (2022) argue that enabling robots to express emotions offers an additional pathway to evoke perceptions of human-likeness and feelings of social support. Companies should test such approaches to create social support and align with the conditions and goals of respective service encounters.

Third, our findings highlight the importance of deliberately testing and orchestrating relevant sensory cues in the context in which they are applied to ensure alignment with the intended customer experience. Our results demonstrate that sensory cues such as service robot voice can meaningfully influence customers' evaluations in recovery contexts and foster perceived social support. Specifically, we find that voice interacts with the service delivery process itself, namely, the provision of monetary compensation. This is consistent with extant research on other sensory elements in service encounters (e.g., Bruder et al., 2021) and underscores the importance of even subtle sensory cues, such as voice. As voice is only one of many sensory cues in service interactions, firms should consider sensory design elements not in isolation but in combination with the service context in which they are deployed.

## 7. Limitations and future research

Across our studies, we show that monetary compensation, as an instrumental form of social support, affects key marketing outcomes and that the interaction between monetary compensation and service robot voice is significant. Anthropomorphic voices have no effect when monetary compensation is offered, yet they improve outcomes when firms choose not to offer monetary compensation. Consequently, firms should employ anthropomorphic voices in such cases. Moreover, we show that this effect is mediated by perceived social support. In our studies, we find that the focal interaction is robust across different types of service robots, male and female service robot voices, and varying levels of monetary compensation.

Nevertheless, further research may address some of the limitations of our studies. For example, future research could examine more precisely when and under which conditions social support operates at the appraisal stage versus the coping stage. While our research conceptualizes social support primarily as a coping resource, it would be valuable to investigate potential differential effects when social support strategies are introduced earlier in the process (and thus shape appraisal) compared to when they are provided later (and primarily facilitate coping). In addition, one limitation of our research is that we compare no monetary compensation with a moderate level of monetary compensation. It would be interesting to identify the level of monetary compensation at which voice anthropomorphism meaningfully influences customer responses, clarifying whether its effects are confined to no compensation or extend to low-compensation recovery scenarios. Future research may also test whether our findings hold for additional types of service robots and different voices. We tested our hypotheses using data from Prolific, did not test our hypotheses in the field, and did not show effects on consequential dependent variables. Additionally, we tested our hypotheses in the US. Research shows that perceptions of voice may vary among cultures (Laukka et al., 2016). It might be interesting to examine the effects of anthropomorphic (vs. non-anthropomorphic) voice in different countries. Finally, our studies focus on the hospitality industry. It would be worthwhile to test whether the hypothesized effects hold in other industries, such as healthcare, requiring further research to validate and extend our findings.

## CRedit authorship contribution statement

**Maximilian Bruder:** Conceptualization (lead), Methodology (lead), Validation (lead), Formal analysis (lead), Investigation (lead), Resources (lead), Data curation (lead), Writing – original draft (lead), Writing – review & editing (lead), Visualization (lead), Supervision (lead), Project administration (lead). **Michael Paul:** Conceptualization (supporting), Methodology (supporting), Validation (supporting), Investigation (supporting), Resources (supporting), Data curation (supporting), Writing –

original draft (supporting), Writing – review & editing (supporting), Visualization (supporting), Supervision (supporting), Project administration (supporting).

## Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## Appendix A: Scenario and Manipulations of Monetary Compensation

### Study 1

Part 1: Imagine you go to a restaurant with two friends. In the restaurant, customers are **only** served by service robots. **So you are not able to talk to a human employee.** After you have sat down, a service robot comes and greets you:

“Dear customer, welcome to the restaurant Foodio, my name is Alex. If you already know what you want to eat and drink, feel free to tell me now.”

Part 2: You and your friends tell the service robot Alex your order and **she** replies:

“Thank you for your order. I will get back to you as soon as your orders are ready.”

Part 3: After a while, the service robot Alex comes back, brings your dish, and says:

“Here you go, your order. Enjoy your meal.”

Part 4: After you have seen the dish, you realize that Alex brought the wrong dish. **Therefore, you tell her** that you would like to get the **correct one**.

“Please accept our sincere apologies for the inconvenience. My voice recognition does not work perfectly sometimes and obviously, I did not understand your order properly. I will get back to you and make sure to bring the correct dish.”

Part 5: While you are waiting, your friends are **eating already**. **You realize that you have to eat alone now because your friends have eaten already.** After a while, Alex comes back and brings the correct dish. **She** says:

Part 6:

Monetary compensation:

“Please accept our sincere apologies for the inconvenience. To compensate for your inconvenience, we will give you a **40 percent** discount on your bill. Enjoy your meal.”

No monetary compensation:

“Please accept our sincere apologies for the inconvenience. Enjoy your meal.”

Part 7: **Due to the mistake of Alex, you eat alone while your friends are already finished.** After you have eaten, you receive a **40 percent** discount on your bill, as promised by Alex. **You pay the reduced amount while your friends do not receive a discount, and you leave the restaurant.**

Part 7: **Due to the mistake of Alex, you eat alone while your friends are already finished.** After you have eaten, you receive your bill from Alex. **You pay the full amount without a discount (like your friends) despite the mistake, and you leave the restaurant.**

Note: Text sections in bold were partially modified in the subsequent scenarios. Text sections in quotation marks were recorded by a professional voice actor in an anthropomorphic (vs. non-anthropomorphic) tone.

Source: Own depiction.

### Study 2a

Part 1: Imagine you go to a restaurant with two friends. In the restaurant, customers are served by service robots. **Customers can talk to the service robots, for example, to communicate their order. Human service employees only appear in the event of serious problems.** After you have sat down, a service robot comes and greets you:

“Dear customer, welcome to the restaurant Foodio, my name is Alex. If you already know what you want to eat and drink, feel free to tell me now.”

Part 2: You and your friends tell the service robot Alex your order and **he** replies:

“Thank you for your order. I will get back to you as soon as your orders are ready.”

Part 3: After a while, the service robot Alex comes back, brings your dish, and says:

“Here you go, your order. Enjoy your meal.”

Part 4: After you have seen the dish, you realize that Alex brought the wrong dish. **So you tell him in a friendly manner** that you would like to get the **right one**.

“Please accept our sincere apologies for the inconvenience. My voice recognition does not work perfectly sometimes and obviously, I did not understand your order properly. I will get back to you and make sure to bring the correct dish.”

Part 5: While you are waiting, your friends are **starting to eat already**. After a while, Alex comes back and brings the correct dish. **He** says:

Part 6:

Monetary compensation:

“Please accept our sincere apologies for the inconvenience. To compensate for your inconvenience, we will give you a **35 percent** discount on your bill. Enjoy your meal.”

No monetary compensation:

“Please accept our sincere apologies for the inconvenience. Enjoy your meal.”

Part 7: **Because of Alex’s mistake, you start eating about 10 min later than your friends.** After you have eaten, you receive a **35 percent** discount on your bill, as promised by Alex. **You pay and leave the restaurant thinking about your experience.**

Part 7: **Because of Alex’s mistake, you start eating about 10 min later than your friends.** After you have eaten, you receive your bill from Alex. **You pay the full amount without a discount and leave the restaurant thinking about your experience.**

Note: Text sections in bold were partially modified from Study 1. Text sections in quotation marks were recorded by a professional voice actor in an anthropomorphic (vs. non-anthropomorphic) tone.

Source: Own depiction.

### Study 2b and Study 3

Part 1: Imagine you go to a restaurant with two friends. In the restaurant, customers are served by service robots. **Human service employees only appear in the event of serious problems.** After you have sat down, a service robot comes and greets you:

“Dear customer, welcome to the restaurant Foodio, my name is Alex. If you already know what you want to eat and drink, feel free to tell me now.”

Part 2: You and your friends tell the service robot Alex your order and **he** replies:

“Thank you for your order. I will get back to you as soon as your orders are ready.”

Part 3: After a while, the service robot Alex comes back, brings your dish, and says:

“Here you go, your order. Enjoy your meal.”

Part 4: After you have seen the dish, you realize that Alex brought the wrong dish. **So you tell him in a friendly manner** that you would like to get the **right one**.

“Please accept our sincere apologies for the inconvenience. My voice recognition does not work perfectly sometimes and obviously, I did not understand your order properly. I will get back to you and make sure to bring the correct dish.”

Part 5: While you are waiting, your friends **are starting to eat already**. **You realize that you have to eat alone now because your friends have eaten already.** After a while, Alex comes back and brings the correct dish. **He** says:

Part 6:

Monetary compensation:

“Please accept our sincere apologies for the inconvenience. To compensate for your inconvenience, we will give you a **35 percent** discount on your bill. Enjoy your meal.”

No monetary compensation:

“Please accept our sincere apologies for the inconvenience. Enjoy your meal.”

Part 7: **Because of Alex’s mistake, you start eating about 10 min later than your friends.** After you have eaten, you receive a **35 percent** discount on your bill, as promised by Alex. **You pay and leave the restaurant thinking about your experience.**

Part 7: **Because of Alex’s mistake, you start eating about 10 min later than your friends.** After you have eaten, you receive your bill from Alex. **You pay the full amount without a discount and leave the restaurant thinking about your experience.**

Note: Text sections in bold were partially modified from the preceding studies. Text sections in quotation marks were recorded by a professional voice actor in an anthropomorphic (vs. non-anthropomorphic) tone for Study 3. In 2b, we did not use the recordings but the text, and we adapted the discount in the monetary compensation condition to 25 percent.

Source: Own depiction.

### Study 2c

Part 1: Imagine you go to a restaurant with two friends. In the restaurant, customers are served by service robots.

**Customers can talk to the service robots, for example, to communicate their order. Human service employees only appear in the event of serious problems.** After you have sat down, a service robot comes and greets you:

“Dear customer, welcome to the restaurant Foodio, my name is Alex. If you already know what you want to eat and drink, feel free to tell me now.”

Part 2: You and your friends tell the service robot Alex your order and **he** replies:

“Thank you for your order. I will get back to you as soon as your orders are ready.”

Part 3: After a while, the service robot Alex comes back, brings your dish, and says: “Here you go, your order. Enjoy your meal.”

Part 4: After you have seen the dish, you realize that Alex brought the wrong dish. **So you tell him in a friendly manner** that you would like to get the **right one**.

“Please accept our sincere apologies for the inconvenience. My voice recognition does not work perfectly sometimes and obviously, I did not understand your order properly. I will get back to you and make sure to bring the correct dish.”

Part 5: While you are waiting, your friends are **starting to eat already**. After a while, Alex comes back and brings the correct dish. **He** says:


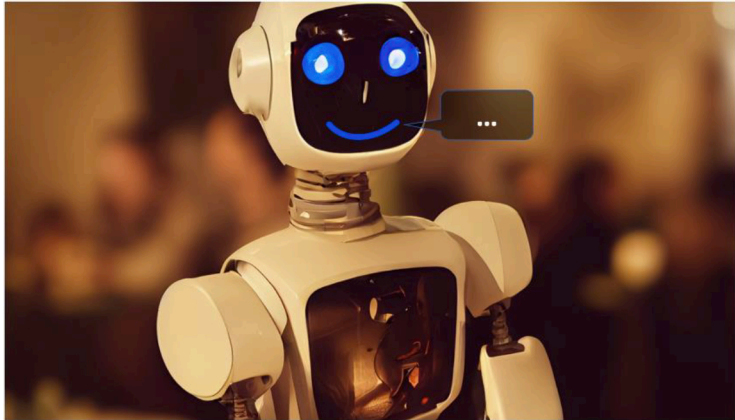

“Please accept our sincere apologies for the inconvenience. Enjoy your meal.”

Part 6: **Because of Alex’s mistake, you start eating about 10 minutes later than your friends.** After you have eaten, you receive your bill from Alex. **You pay the full amount without a discount and leave the restaurant thinking about your experience.**

Note: Text sections in bold were partially modified from prior studies. Text sections in quotation marks were recorded by a professional voice actor in an anthropomorphic (vs. non-anthropomorphic) tone.

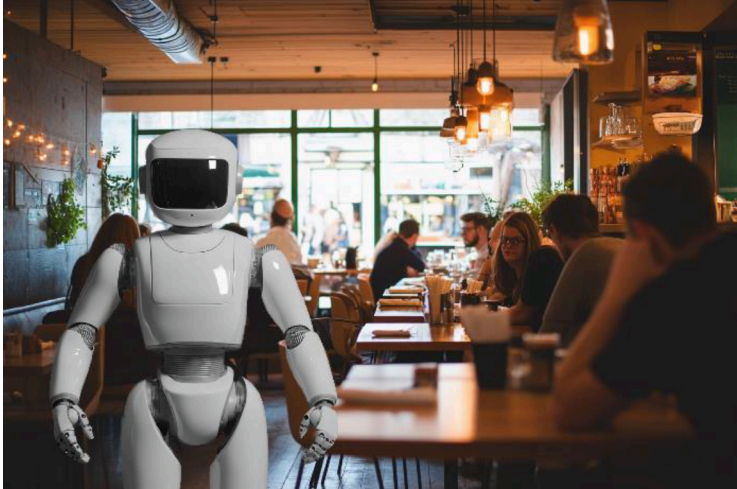
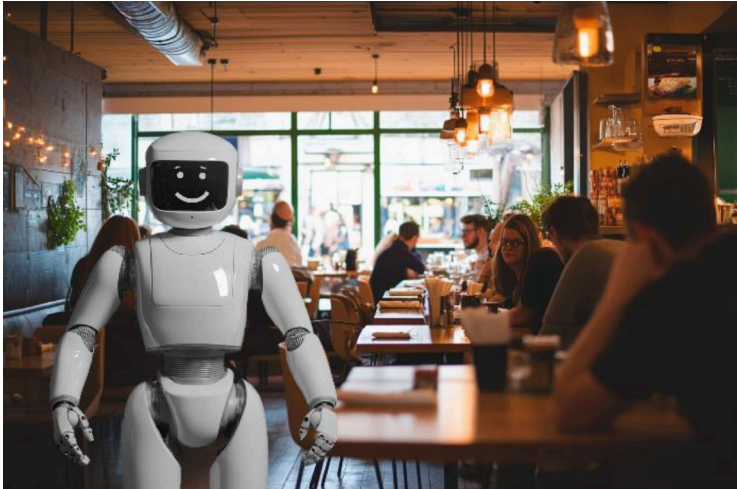
Source: Own depiction.

**Appendix B: Pictures of Service Robots**

Study	Picture
Studies 1 and 3	
Study 2a	
Studies 2b and 2c (non-anthropomorphic service robot)	

*(continued on next page)*

(continued)

Study	Picture
Study 2b (anthropomorphic service robot)	
Study 2c (anthropomorphic service robot)	

Source: Own depiction.

**Appendix C: Scales and items**

*Attitude toward the brand* (adapted from [Hagtvedt, 2011](#)), Studies 1, 2a, 2b, and 2c.

The restaurant Foodio is good.  
 The restaurant Foodio is favorable.  
 The restaurant Foodio is likable.  
 The restaurant Foodio is pleasant.

*Satisfaction with the service robot* (adapted from [Brady et al., 2005](#)), Study 3

I am satisfied with the service robot Alex.  
 I am delighted with the service robot Alex.  
 I am happy with the service robot Alex.

*Customer-perceived social support* (adapted from [Zimet et al., 1988](#)), Study 3.

I can count on the service robot Alex when things go wrong  
 The service robot Alex really tries to help me.  
 I feel like I can get the emotional help and support I need from the service robot Alex

*Eeriness* ([Mende et al., 2019](#)), Study 3.

The service robot is

... eerie.  
... creepy.  
... unnatural.

*Uniqueness neglect* (Longoni, Bonezzi, and Morewedge, 2019), Study 3  
The service robot

... did not recognize the uniqueness of my experience.  
... did not consider my unique circumstances.  
... did not tailor his actions to my unique case.

*Service robot voice manipulation check*, Studies 1, 2a, 2c, 3  
The voice sounds ...

... artificial.  
... unnatural.  
... mechanical.

*Service robot appearance manipulation check*, Studies 2b and 2c

The robot looks like a person.  
The robot looks like a human.  
The robot has a body like a human being (with arms, head, and legs).  
The robot looks like a machine. (reversed)

*Realism and voice fit*, Studies 1–3

The scenario makes sense.  
The voice fits a service robot.

*Social actor perceptions*, Pretest Study 3

The service robot appeared to be capable of social interaction.  
The service robot appeared to have social qualities.  
The service robot conveyed a sense of social presence.  
I perceived the service robot as a social actor.

## Data availability

Data will be made available on request.

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