



Partner or servant? The influence of robot role positioning on consumers' brand evaluations[☆]

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ABSTRACT

Despite the increasing use of robots in marketing to improve consumers' perceptions of brand image, relatively little is known about how the positioning of robots (i.e., as either partners or servants) influences consumer evaluations of brands employing service robots. In this paper, we examine the effect of robot role positioning on consumers in four studies within the context of time-honored brands. Study 1 demonstrates that brands using robots positioned as partners (vs. servants) will enhance consumers' brand evaluations. Study 2 shows that psychological distance is a mechanism underlying the effect between robot role positioning and consumers' brand evaluations. Studies 3 and 4 consider power distance belief (PDB) and service type to explore the premise's boundary and find that these factors moderate the effect of robot role positioning on consumer brand evaluations. The findings offer theoretical and managerial implications for human-robot interaction in marketing.

1. Introduction

As an emerging technology, service providers increasingly adopt humanoid intelligent robots (Alicia & Kayley, 2023). They are considered as an effective means of service innovation and increasing brand vitality (Murphy et al., 2017; Van Doorn et al., 2017). An illustrative example is The Park Hotels in India, established in 1967. To create novel brand experiences, they introduced "The Park Pad," a virtual concierge service that accompanies guests throughout their stay, acting as a partner. Similarly, Quan Ju De, a restaurant chain in China best known for their Peking roast duck, has employed the robot "Huasheng" as a servant since 2018. The upscale international hotels, J.W. Marriott Marquis in Dubai and the Hilton Hotel in Toronto have also recently employed room service robots as servants to deliver room service to customers.

Recently, research has begun to pay close attention to service robots and their implications for consumers' attitudes and intentions. The use of robots has had a significant positive effect on consumer service experiences. It has been found to enhance critical elements of businesses, such as service consistency, decreased waiting times, and overall higher

productivity. It is, therefore, essential to examine the specific roles that service robots perform (Seo & Lee, 2021).

Most robot-related factors explored in the nascent literature include robots' humanoid characteristics and social attributes. For example, anthropomorphized robots directly affect consumers' perceptions of trust, intention to use, and enjoyment (Van Pinxteren et al., 2019). As a result, anthropomorphism can foster trust in humanoid intelligent robots and enhance consumers' willingness to utilize them. It is vital to understand what roles robots play in interacting with consumers and what impact these roles have on consumers.

While some researchers have investigated the effect of robot social roles (e.g., as a tutor) on consumers' adoption intentions (Lee et al., 2017; Serholt, 2018; Shin & Jeong, 2020), this topic has not been thoroughly examined. This paper examines how robots' social roles as partners or servants are associated with consumers' brand evaluations. Addressing brand evaluations categorized under partner or servant roles, Hsieh et al. (2021) contend that partner brands manifest stronger social connections than servant brands. This assertion bears significant implications for brand strategists endeavoring to position their products adeptly in the market. Hsieh et al. (2021) argue that social connections

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are perceived as stronger for partner brands than servant brands, holding substantial implications for brand managers seeking to position their offerings effectively. Although the partner and servant roles are well-explored in brand marketing, they have received considerably less attention in consumer-robot interactions (Aggarwal & McGill, 2012).

Many factors influence consumers' preferences for partner and servant brand roles; for example, consumers with an interdependent self-construal prefer partner brands, while those with an independent self-construal are equally inclined to select partner or servant brands (Hsieh et al., 2021). Research asserts that materialists respond more favorably to servant brands than partner brands (Kim & Kramer, 2015). Inspired by these findings, we considered whether positioning robots as partners and servants will impact consumers' brand evaluations. Specifically, our research focused on robot positioning strategy. Robots have been intentionally designed and presented as partners or servants in brand promotion, influencing consumers' brand perceptions (Sharma & Rahman, 2022). Additionally, due to their humanoid characteristics, service robots' interactions prompt individuals to perceive them as social entities and contribute to fostering social connections (Choi et al., 2019). Previous research has also indicated that partner brands were associated with higher social connections than servant brands (Hsieh et al., 2021). We will verify whether this effect exists under varied robot roles and explore influencing factors. As an essential dimension of psychological distance, as described by Trope and Liberman (2010), social distance in this paper measures the interpersonal similarities between consumers and robots in distinct roles.

Partner versus servant roles imply a disparity in the relationship's power structure (Kim & Kramer, 2015; Han et al., 2019). Positioning robots as partners or servants may trigger consumers' perceptions of their position relative to the robots, which means that personal values regarding status must be considered, namely, PDB. Kirkman et al. (2006) advocated adopting PDB at the individual level as a moderating factor. Therefore, we aim to manipulate rather than measure participants' PDBs through priming and investigate their impact on the psychological distance between consumers and robot roles. Moreover, given that service robots interact with consumers in the context of marketing services, it is necessary to consider the role of service types. Hedonic services typically evoke feelings of pleasure and excitement, whereas utilitarian services are characterized by their functional and practical nature (Collier et al., 2014; Dhar & Wertenbroch, 2000). These distinctions in service types may influence consumers' perceptions of robot role positioning and subsequently affect their brand evaluations.

In summary, our research investigates the effect of robot role positioning (partner vs. servant) on consumer brand evaluations, contributing to the expanding field of robot positioning strategy. The findings are valuable for brand managers aiming to strategically position the role of robots. Subsequently, we measured the psychological distance between consumers and robot roles and found that PDB affects consumers' psychological distance perceptions of robot roles and brand evaluations. This finding confirms that individual values can influence consumers' perceptions of social relationships. The exploration of the interacting effect of service types and robot role positioning further deepens the connection between our research and marketing practice. This relationship underscores the significance of psychological distance and power disparity in shaping brand perceptions, emphasizing the need to carefully select appropriate robot role positioning based on different service types. Moreover, we use time-honored brands as our research context because of the increasing interest in such brands to revitalize their image using service robots (Zhang et al., 2021). These insights provide valuable guidance for future research and marketers in leveraging service robots to enhance consumers' brand experiences.

2. Literature review and hypothesis development

2.1 Robot role positioning

Robots' increasing diversity and functionality have led them to assume service roles in various contexts (Lu et al., 2020; Wirtz et al., 2018). This emergence of service robots has significantly transformed face-to-face service interactions (Mende et al., 2019), challenging the interplay of roles in service encounters (Larivière et al., 2017; Subramony et al., 2018). Since robots can provide verbal and non-verbal clues similar to humans to express emotions and intentions (Breazeal, 2003), they can assume different service roles traditionally fulfilled by human employees (Huang & Rust, 2018). By activating mental schemas, humans perceive and interact with robots as interactive partners and peers (Fong et al., 2003; Qiu et al., 2020). For example, elderly individuals living alone engage in social interactions with service robots similar to those they would have with human partners (Wang et al., 2019), while children develop social relationships with robots in educational settings, with the quality of their interactive relationships being influenced by the social attributes of the robots (Oh & Kim, 2010). Existing literature on human-robot service interaction has highlighted that consumers perceive their interactions with robots as social interactions imbued with role meanings (Blaurock et al., 2022). Consequently, understanding how to effectively position service robots to influence consumer perceptions has become an essential and worthy area of research attention (Schepers & van der Borgh, 2020; Wirtz et al., 2018).

Previous research has shown that marketing managers often position service robots in various roles, such as medical assistants (Lee et al., 2017), tutors (Serholt, 2018), and concierges (Shin & Jeong, 2020). These diverse robot role positions are chosen to align with the expectations and needs of consumers (Edwards et al., 2019). Our research specifically focuses on two distinct robot role positionings (partner role vs. servant role), which have many different traits. Partner role signifies a long-term alliance characterized by high trust, mutual support, and assistance (Fournier, 1998). In marketing contexts, consumers expect partners to fulfill promises (Iacobucci & Grayson, 1995), avoid relationship failures (Smith et al., 1999), and serve their long-term interests (Braun & Zaltman, 2000). Within the context of human interaction, a partner can offer a sense of supportiveness and reliability that can lead to intentions from both sides to meet certain relational obligations (Moorman et al., 1993; Aaker et al., 2004). Therefore, the partner role often symbolizes an image of long-term commitment and safeguarding the interests of both sides. In contrast, consumers do not seek direct engagement with servant roles, typically perceived as outsourced benefit providers (Aggarwal & McGill, 2012). Compared to the partner role, the servant role is only responsible for providing ready-made products and services to save consumers' time and effort (Han et al., 2019) without a commitment to the quality of products and services.

Based on the above discussion, we proposed that positioning service robots as partners or servants would result in distinct consumer evaluations. Positioning robots as partners can signal a commitment to safeguarding consumer interests and maintaining long-term relationships, which align with consumers' expectations of obtaining superior products and services through a collaborative partnership (Araujo, 2018). This is particularly relevant in the context of time-honored brands, where previous research has demonstrated that consumers often associate time-honored brands with high-quality products and services (Simon & Sullivan, 1993; Zhang et al., 2019). When brands utilize robots positioned as partners, consumers will have more confidence in obtaining products and services that align with their expectations. In contrast, robots positioned as servants fail to evoke the same effect. Since consumers perceive servant roles primarily to have them complete the work on their behalf (Aggarwal & McGill, 2012; Han et al., 2019), robots positioned as servants do not match the brand's image. Therefore, using time-honored brands as our context, we predict that:

H1: Consumers will have more favorable brand evaluations of brands that use robots positioned as partners rather than servants.

2.2 The mediating role of psychological distance

Psychological distance is a subjective perception of the distance or closeness between oneself and an entity (Trope & Liberman, 2010). It encompasses various dimensions such as spatial, temporal, and social distance (Liberman & Trope, 2014; Liberman et al., 2007). Since the perception of psychological distance is subjective, individuals may not always accurately perceive psychological distance due to the influence of various cognitive factors. Previous research has demonstrated that individuals perceive more desirable objects or locations as closer in physical space than less desirable ones (Balceris & Dunning, 2010). Similarly, individuals may feel closer to others after experiencing social rejection while distancing themselves from those who have rejected them (Pitts et al., 2014; Knowles et al., 2014).

The relationship between psychological distance and robots has attracted the attention of researchers in recent years. For example, studies have shown that when artificial intelligence (AI) agents in nonprofit charities are designed to resemble humans and exhibit human-like behaviors such as smiling, potential donors perceive them as closer and feel motivated to increase charitable donations (Baek et al., 2022). The perception of robots as more humanoid entities is associated with more positive evaluations, mediated by psychological distance (Li & Sung, 2021). These findings highlight the influence of humanoid robots on people through psychological distance. Service robots, in particular, possess social attributes and humanoid characteristics, leading people to perceive them as social participants (Choi et al., 2019). Similarly, the social qualities of robots have been found to impact their service effectiveness (Duffy, 2003). Thus, the social attributes of humanoid service robots play a significant role in the perception of social distance more than other dimensions of psychological distance. Based on these reasons, our primary focus in this paper is on the impact of robot role positioning on consumers' psychological distance within the social dimension and the subsequent effect on brand evaluations.

Partner roles are often associated with long-term alliances and high trust (Fournier, 1998), which aligns with consumers' perceptions (e.g., Zhang et al., 2019) and expectations (e.g., Braun & Zaltman, 2000) of time-honored brands. The alignment fosters a sense of in-group membership and psychological closeness (Brewer, 1979). Prior studies have demonstrated that consumers perceive partner brands as closer, suggesting that partner brands are associated with a higher social connection than servant brands (Hsieh et al., 2021). Since people are more inclined to regard robots as partners (Jecker, 2020; Evers et al., 2008), in a human-robot interaction context, we posited that robots positioned as partners will afford a more significant social connection and closer psychological distance. Psychological distance significantly influences consumers' evaluation (Laran, 2010; Kivetz et al., 2006) and intention (Touré-Tillery & Fishbach, 2017). People are more willing to help and have higher evaluations of those who are socially closer to them (Rachlin & Jones, 2008). Consumers tend to have higher evaluations of close-relationship members than those considered distant-relationship members (Brewer, 1979). Consumers evaluate psychologically closer objects (e.g., one's own money) more positively than psychologically more distant objects (e.g., other people's money) (Polman et al., 2018), and they form stronger self-brand connections with brands that seem to possess features of intimates (Escalas & Bettman, 2005). Therefore, when brands position robots as partners, it enhances the perceived social connection and psychological proximity between consumers and the brand, leading to more favorable evaluations. Therefore, once again, using time-honored brands as our context, we predict that:

H2: Psychological distance mediates the effect of robot role positioning (partner vs. servant) on consumers' brand evaluations. Service robots positioned as partners (vs. servants) lead consumers to feel a closer psychological distance and have a more favorable brand

evaluation.

2.3 The moderating role of power distance belief

Power Distance Belief refers to a culture's expected degree of disparity (Hofstede, 2001; Caputo et al., 2018; Oyserman, 2006). While traditionally studied at the country and cultural level (Hofstede, 2001), recent research has revealed that PDB can also be manifested at the individual level, with individuals with different levels exhibiting varying degrees of tolerance toward inequality (Lian et al., 2012). Positioning strategies also temporarily influence power distance belief (Zhang et al., 2010; Winterich & Zhang, 2014). Previous literature suggests that PDB influences consumers' psychological reactions and subsequent behaviors toward various entities (Kim & McGill, 2011; Kirkman et al., 2009). For example, individuals with low PDB (vs. high PDB) are more likely to engage in prosocial behaviors, such as charitable donations, as they tend to focus on others (Han et al., 2018). Conversely, individuals with high-PDB exhibit a heightened awareness of social hierarchy and are more responsive to authority (Winterich et al., 2018). Power distance belief can also foster collaboration between partners to pursue shared benefits. Low-PDB consumers are more inclined to adopt a cooperative approach in dealing with partners, creating common benefits (Van Esch et al., 2023).

In the research on brand roles, the differentiation between partner and servant roles stems from several factors, including the relative positions of brands and consumers. When consumers perceive a brand as a partner, they establish a sense of equality in the relationship, while perceiving a brand as a servant empowers the consumer, positioning them as dominant over the brand (Han et al., 2019). Drawing from these findings, it is reasonable to posit that similar distinctions in relative positions exist in robot roles (partner vs. servant). These two distinct robot role positions and subsequent consumer-robot relationships may evoke perceptions of power disparities (Han et al., 2019; Ho et al., 2021).

Given these theoretical underpinnings, this study aims to explore the role of PDB by examining how robot role positioning (partner vs. servant) influences consumers' brand evaluations.

It is important to note that an essential difference between high and low PDB is not the extent to which power disparity and social hierarchy exist but rather the degree to which an individual accepts it (Han et al., 2018; Winterich & Zhang, 2014). Prior research has shown that people with high PDB are willing to maintain the existing social order, perceiving that power disparity and disparities in the social hierarchy are normal and acceptable (Kim & Zhang, 2014), while those with low PDB tend to reject unequal power distribution and eliminate it (Hofstede, 2001). In other words, consumers with low PDB are more willing to accept cooperation based on equal status than consumers with high PDB, rather than exacerbating inequality, since the partner role refers to a long-term alliance with increased trust and involves a commitment to support and help each other (Fournier, 1998), we predict that consumers with low-PDB will prefer robots positioned as partners. In contrast, consumers with high PDB are more willing to perceive robots as servants, which aligns with their understanding of social hierarchy. This preference for different role positioning of robots can affect consumers' perception of psychological distance; prior work has found that more desirable objects or locations are perceived closer than less desirable ones for consumers (Balceris & Dunning, 2010), people feel positive objects (e.g., chocolates) closer than negative ones (e.g., dog feces; Alter & Balceris, 2010). Because of this, we infer that when consumers have a different level of PDB, their perceptions of psychological distance to robot role positioning will be discrepant and consequently affect consumers' brand evaluations. Therefore, within our perspective of time-honored brands, we predict that:

H3: Power distance belief moderates the effect of robot role positioning on brand evaluations via psychological distance.

H3a: For consumers with high PDB, service robots positioned as

servants (vs. partners) will reduce consumers' psychological distance and lead to more favorable brand evaluations.

H3b: For consumers with low PDB, service robots positioned as partners (vs. servants) will reduce consumers' psychological distance and lead to more favorable brand evaluations.

2.4 The moderating role of hedonic versus utilitarian services

Hedonic (utilitarian) services refer to services perceived by customers as relatively more hedonic (utilitarian) rather than more utilitarian (hedonic) in nature (Dhar & Wertenbroch, 2000; Okada, 2005). Hedonic services are distinguished by their social and emotional elements, while utilitarian services emphasize functional quality, cost performance, and other pragmatic cues (Prebensen & Rosengren, 2016). In terms of the benefits provided to consumers, utilitarian services deliver practical advantages such as functions and tools, whereas hedonic services offer emotional pleasure. As a result, hedonic services are commonly associated with enjoyable and exciting experiences, while consumers typically choose utilitarian services to accomplish specific tasks (Dhar & Wertenbroch, 2000; Strahilevitz & Myers, 1998). During interactions with service providers, consumers' goal-oriented mindset in utilitarian services leads them to prioritize satisfying their needs and making rational decisions based on functionality rather than emotional reactions (Jiang & Wang, 2006). Although specific services are often classified into distinct service types, such as air travel as utilitarian and tourist attractions as hedonic (Prebensen & Rosengren, 2016), service perception as hedonic or utilitarian can vary depending on consumers' needs. For instance, having dinner with friends at a restaurant may be perceived as highly hedonic, whereas the same restaurant may be viewed as more utilitarian when socializing with business partners (Blinda et al., 2019).

Given the attributes above distinguishing hedonic and utilitarian services, we contend that these two service types serve as boundary conditions in our research. Specifically, when consumers interact with robots positioned as partners or servants within a service context, the kind of service may influence consumers' perceptions of the robots and their evaluations of the associated brands. In the context of hedonic service, consumers usually hope to obtain emotional pleasure and evaluate service quality based on how much joy they have received (Wakefield & Blodgett, 1999), emphasizing emotional communication and interaction. When positioned as partners, robots are more likely to evoke emotions in consumers, providing a sense of supportiveness and reliability that can lead to interaction (Moorman et al., 1993; Aaker et al., 2004). Therefore, when robots are positioned as partners, applying robots in a hedonic service context will positively impact consumer brand evaluations. However, in utilitarian services, where consumers prioritize tangible benefits that ultimately be obtained (Jiang & Wang, 2006), the different role positions of service robots are unlikely to significantly influence consumers' evaluations. In other words, when robots are positioned as servants, there is no significant difference in brand evaluations, whether in hedonic or utilitarian service contexts. Therefore, we predict that:

H4: The service context interacts with the robot role positioning, such that a robot positioned as a partner (compared to a servant) leads to more favorable evaluations in hedonic than utilitarian service contexts.

3. Study 1

Study 1 tests hypothesis 1 by examining the effect of robot role positioning on consumers' brand evaluations within the context of time-honored brands. In our prediction, service robots positioned as partners (vs. servants) will lead to more favorable brand evaluations.

3.1 Study design and sample

This study featured a 2 (robot role positioning: partner vs. servant)

between-subjects design. Brand evaluation is the dependent variable. One hundred thirty-four online participants (67 men, 67 women; $M_{age} = 30.87$) were recruited for this study via the SOJUMP platform, a Chinese online panel that provides nationally diverse samples for data collection (Del Ponte et al., 2024). The participants were randomly assigned to one of the two experimental conditions.

3.2 Stimuli and procedures

Robot role positioning was manipulated by presenting a brief introduction image using human-like elements along with a first-person point of view (Hsieh et al., 2021; Han et al., 2019); specifically, two pictures were designed for the long-established Chinese brand "Dong Lai Shun," which uses service robots to provide ordering and other services. Established in 1903, Dong Lai Shun reflects a time-honored brand given its long history of survival and success dating back to the 29th year of the Guangxu reign during the Qing Dynasty (Beijing Tourism, 2013). The two pictures were identical except for the instructions (See Appendix A for the images used in Study 1).

A pretest with 63 participants validated the effectiveness of the manipulation, and participants were randomly assigned to either the partner or servant condition (22 men, 41 women; $M_{age} = 29.10$). Participants in the partner positioning condition were exposed to the image with the following instructions: "Hi! I am your partner, Dongbao. As a partner, I will share a pleasant dining experience with you." Those in the servant positioning condition read, "Hi! I am your servant, Dongbao. As a servant, I will provide a pleasant dining experience for you." Servant perceptions were measured on a Likert scale through the following statement ("The robot is like a servant to me"). Partner perceptions ("The robot is like a partner to me") are anchored by 1 = Strongly disagree, and 7 = Strongly agree, as adapted from Kim & Kramer (2015). The results of the pretest showed that the manipulation was effective. The servant manipulation resulted in stronger servant perceptions than the partner manipulation ($M_{servant-condition} = 5.30$, $SD = 1.12$; $M_{partner-condition} = 3.79$, $SD = 1.67$; $F(1,61) = 17.42$, $p < 0.001$), and the partner manipulation resulted in stronger partner perceptions than the servant manipulation ($M_{partner-condition} = 5.36$, $SD = 1.11$; $M_{servant-condition} = 4.60$, $SD = 1.40$; $F(1,61) = 5.77$, $p = 0.02$).

In Study 1, 134 participants were randomly assigned to one of the two experimental conditions. First, participants read an introduction to the long-established brand "Dong Lai Shun". The introduction stated, "Dong Lai Shun was founded in 1903. This traditional Chinese catering brand has a long history and enjoys a reputable reputation in Beijing's catering industry". Then, the participants examined the "Dong Lai Shun" photo and its corresponding description. In the partner positioning condition, participants read, "Hi! I am your partner Dongbao. As a partner, I will share a pleasant dining experience with you". Those in the servant positioning condition read, "Hi! I am your servant Dongbao. As a servant, I will provide a pleasant dining experience for you." Next, the participants completed the partner and servant perceptions measures.

Participants then completed measures of consumer brand evaluations and demographics (e.g., gender and age). Consumer brand evaluations were captured via four items: "I think this brand is good," "This brand is very attractive to me," "I am satisfied with this brand," and "I like this brand very much" (1 = strongly disagree, 7 = strongly agree; $\alpha = 0.75$; Davtyan & Cunningham, 2017).

3.3 Results and discussion

Servant perceptions ("This robot is like a servant to me") and partner perceptions ("This robot is like a partner to me") were measured anchored by 1 = Strongly disagree, and 7 = Strongly agree (Kim & Kramer, 2015). As expected, participants assigned to servant (vs. partner) positioning condition agreed that robots are more like servants ($M_{servant-condition} = 5.60$, $SD = 0.95$; $M_{partner-condition} = 3.88$, $SD = 1.66$; $F(1,132) = 55.69$, $p < 0.001$), and the participants assigned to partner (vs.

servant) positioning condition agreed that robots are more like partners ($M_{\text{partner-condition}} = 5.55, SD = 0.91; M_{\text{servant-condition}} = 4.57, SD = 1.31; F(1,132) = 24.56, p < 0.001$). The manipulation was, therefore, successful.

An ANOVA was conducted across the robot role positioning conditions with brand evaluation as the dependent variable to assess if there were any significant differences in the brand evaluation due to robot role positioning. The results indicated a significant effect of robot role positioning on brand evaluations ($M_{\text{partner}} = 6.00, SD = 0.48; M_{\text{servant}} = 5.63, SD = 0.76; F(1,132) = 11.02, p = 0.001$).

Study 1 supports H1 that robot role positioning influences consumer brand evaluations. Specifically, compared to robots positioned as servants, robots positioned as partners will lead to high brand evaluations of time-honored brands.

Current literature suggests that people generally have positive attitudes toward close psychological distance (Li & Sung, 2021; Rachlin & Jones, 2008; Brewer, 1979; Polman et al., 2018). The close psychological distance can directly or indirectly affect consumers' brand evaluations (Bornemann & Homburg, 2011; Woo et al., 2013). In the previous discussion, we assumed that robots positioned as partners can provide consumers with greater perceptions of support and reliability (Moorman et al., 1993; Aaker et al., 2004), making it easier to be seen as consumers' in-group members and thus psychologically closer to consumers (Brewer, 1979). In the following Study 2, we will test this hypothesis.

4. Study 2

Study 2 demonstrates that robots positioned as partners will decrease the psychological distance between consumers and brands to enhance brand evaluations. Specifically, it examines the potential mediating role of psychological distance on the relationship between robot role positioning and consumers' brand evaluations within the context of time-honored brands.

4.1 Study design and sample

A two (robot role positioning: partner vs. servant) between-subjects design was adopted to test H2. One hundred thirty-seven online participants were recruited for Study 2 via the SOJUMP platform and randomly assigned to one of the two experimental conditions (42 men, 95 women; $M_{\text{age}} = 30.08$).

4.2 Stimuli and procedures

The brand "Go Believe" (translated from the Chinese word "Goubuli") was chosen for Study 2, which has offered a variety of stuffed bao (i.e., steamed bun) dishes since 1858, making it one of the longest-running brands in China (Goubuli Group Co., 2020). The service robot was given the name "Tangbao." A new method was used to manipulate robot role positioning. Specifically, participants were presented with the same picture of the "Go Believe" brand and the service robot "Tangbao" and one of two different text descriptions with robot role positioning hints (adapted from Aaker et al., 2004; see Appendix B).

Participants were randomly assigned to one of the two experimental conditions. They were then instructed to read an introduction to the "Go Believe" brand and were presented with a picture with the following text: "Go Believe was founded in 1858. It is a time-honored brand in China with a long history. It was once a tribute to the emperor and has a lofty position in the history of Chinese food". Then, participants were given one of two additional pieces of information depending on their assigned condition. In the partner positioning condition, participants were shown that "Tangbao" could recommend dishes to customers like an intimate partner and could ask customers about their tastes and diet. The manager stated, "We hope Tangbao can become a good partner of customers and create a pleasant dining experience with customers." In the servant positioning condition, participants were shown that

"Tangbao" can recommend dishes to customers like the most loyal servant and ask customers about their tastes and diet. "We hope Tangbao can become a good servant of customers and provide a pleasant dining experience for customers," said the manager. Then, they completed the measurement assessment of robot role positioning perceptions, psychological distance, brand evaluations ($\alpha = 0.89$), and demographics (e.g., gender and age). The measurements of robot role positioning perceptions, brand evaluations, and demographics were the same as those in Study 1.

To measure psychological distance, we utilized the Inclusion of Other in the Self (IOS) scale, a widely recognized tool for assessing the perceived closeness between an individual and an object (Xu et al., 2017; Brough & Isaac, 2012; Aron et al., 1992). Participants were presented with seven Venn-like diagrams composed of pairs of circles with varying degrees of overlap; each pair consisted of one circle labeled "self" and another labeled "Go Believe." According to the degree of overlap ranging from less to more, these pairs of circles are marked from 1 ("far psychological distance") to 7 ("close psychological distance"). Participants were required to choose one of the seven pairs to answer one question, "Which picture best describes your feelings towards this brand 'Go Believe'?".

4.3 Results and discussion

One-way ANOVA was used to analyze robot role positioning. The data showed that the manipulation of robot role positioning was successful. Specifically, participants assigned to the partner condition (vs. servant condition) had stronger partner perceptions ($M_{\text{partner-condition}} = 6.06, SD = 0.83; M_{\text{servant-condition}} = 3.24, SD = 1.00; F(1,135) = 322.14, p < 0.001$). Similarly, participants assigned to the servant condition (vs. partner condition) had stronger servant perceptions ($M_{\text{servant-condition}} = 5.61, SD = 0.97; M_{\text{partner-condition}} = 2.84, SD = 1.15; F(1,135) = 231.34, p < 0.001$).

An ANOVA was conducted across the robot role positioning conditions with brand evaluation as the dependent variable. The results indicated that there was a significant effect of robot role positioning on brand evaluations ($M_{\text{partner}} = 6.24, SD = 0.44; M_{\text{servant}} = 4.86, SD = 0.97; F(1,135) = 115.18, p < 0.001$). Therefore, we reconfirmed H1 and proved the robustness of our hypothesis.

The bootstrapping method (Model 4; Hayes, 2017) was used to test the mediation effect of psychological distance underlying the effect of robot role positioning on consumer brand evaluations (H2). First, robot role positioning was specified as the independent variable (coded as 0 = servant, 1 = partner), psychological distance as the mediator, and brand evaluation as the dependent variable. The results showed that psychological distance mediates the effect of robot role positioning on consumers' brand evaluations. There was a significant total effect of robot role positioning on brand evaluations (total effect = 1.38; 95% CI = [1.12, 1.63]). Meanwhile, there was a significant indirect effect via psychological distance (indirect effect = 0.49; 95% CI = [0.27, 0.73]), which supports the mediation effect. Robots positioned as partners (compared to robots positioned as servants) made consumers feel a closer psychological distance, which in turn led to more favorable brand evaluations. Moreover, the direct path was significant (direct effect = 0.89; 95% CI = [0.59, 1.19]), indicating that psychological distance was a partial mediation, supporting H2. Fig. 1 contains the mediation results for Study 2.

Prior research suggests that consumers with different PDBs have diverse mental horizons and perceptions of objects (Kirkman et al., 2009; Magee & Smith, 2013). Given that robots positioned in various roles can elicit different perceptions of power, it is vital to consider the boundary condition of PDB in subsequent studies. Specifically, consumers treat partner brands based on an equal relationship. In contrast, they dominate the brand when they view it as a servant (Han et al., 2019). Consequently, consumers with different PDBs would have corresponding preferences for robot role positioning. Therefore, exploring

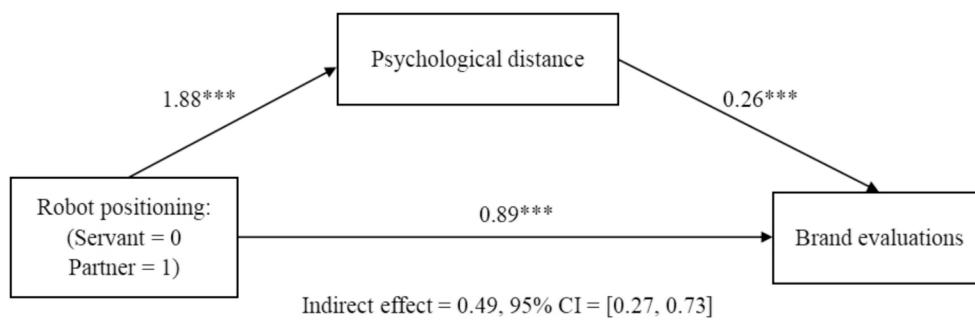


Fig. 1. Mediation Results (Study 2). Notes: Mediation analysis with 5,000 bootstrap samples (model 4 in PROCESS; Hayes, 2017). Coefficients significantly different from zero are indicated by asterisks (* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$). The total effect was significant (1.38; 95% C.I. from 1.12 to 1.63). The indirect effect through psychological distance (the effect hypothesized in H2) was significant (0.49; 95% C.I. from 0.27 to 0.73). The direct effect was significant (0.89; 95% C.I. from 0.59 to 1.19).

the boundary condition, PDB is considered in the subsequent study.

5. Study 3

Study 3 examines how PDB affects the impact of robot role positioning on consumer brand evaluations (H3). The dependent variable is brand evaluation.

5.1 Study design and sample

Study 3 employed a 2 (robot role positioning: partner vs. servant) \times 2 (PDB: high vs. low) between-subjects design. One hundred sixty-two online participants were recruited for Study 3 via the SOJUMP platform (76 men, 86 women; $M_{\text{age}} = 29.52$).

5.2 Stimuli and procedures

This study used the time-honored brand “LAO MIAO Jewelry” and its service robot “Xiubao” to manipulate robot role positioning. LAO MIAO Jewelry is over 100 years old and has won China’s honorary Crown of Gold Field.

Power distance belief was manipulated using a priming task (Zhang et al., 2010). Participants were first presented with the text, “There should be an order of inequality in this world in which everyone has a rightful place; this order protects higher and lower societal levels.” In the high-PDB condition, participants were asked to write three reasons that supported the statement. While in the low-PDB condition, participants were asked to write three reasons against the statement. Next, a three-item, seven-point scale (including “I mainly think that...,” “I believe that...,” and “I agree with the saying that...”; 1 = social equality is important, and 7 = social hierarchy is important; $\alpha = 0.95$) was used to measure the PDB (Zhang et al., 2010).

To manipulate the robot role positioning, the same approach used in Study 2 was implemented for this study. Participants were presented with the same picture of the time-honored brand “LAO MIAO jewelry” and the service robot “Xiubao,” and one of two different text descriptions with robot role positioning hints to manipulate robot role positioning perceptions (Aaker et al., 2004; see Appendix C). In the partner role condition, participants were shown that “Xiubao” can recommend the latest products to customers like the most intimate partner, patiently listen to customers’ demands, and jointly create a happy shopping experience with customers. In the servant role condition, participants were shown that “Xiubao” could recommend the latest products to customers like the most loyal servant, patiently listen to customers’ demands, and wholeheartedly provide a happy shopping experience for customers.

Participants were randomly assigned to a high-PDB or low-PDB condition during the experiment by a priming task. Then, they were

randomly assigned to one of the two experimental conditions and instructed to read the same picture with one of the two text descriptions with robot role positioning hints. They then completed the measures of robot role positioning perceptions, psychological distance, brand evaluations, and demographics (e.g., gender and age). The measurements of robot role positioning perceptions, psychological distance, brand evaluations ($\alpha = 0.83$), and demographics were the same as those in Study 2.

5.3 Results and discussion

An independent sample t -test was conducted to check the manipulation of PDB. The results showed that the manipulation was successful ($M_{\text{high}} = 4.18$, $SD = 1.94$; $M_{\text{low}} = 2.00$, $SD = 0.97$; $t(160) = -9.05$, $p < 0.001$).

One-way ANOVA was used to analyze the robot’s role positioning. The results showed that the manipulation of robot role positioning was successful; participants assigned to the partner condition had stronger partner perceptions than those assigned to the servant condition ($M_{\text{partner-condition}} = 5.27$, $SD = 1.01$; $M_{\text{servant-condition}} = 4.21$, $SD = 1.53$; $F(1,160) = 27.11$, $p < 0.001$). Similarly, participants assigned to the servant condition had stronger servant perceptions than those assigned to the partner condition ($M_{\text{servant-condition}} = 5.00$, $SD = 1.42$; $M_{\text{partner-condition}} = 4.05$, $SD = 1.57$; $F(1,160) = 16.28$, $p < 0.001$).

A 2 (robot role positioning: partner vs. servant) \times 2 (PDB: high vs. low) between-subjects ANOVA on psychological distance was conducted. The two-way interaction between robot role positioning and PDB was significant ($F(1,158) = 13.22$, $p < 0.001$). Contrast analyses revealed that participants with high-PDB perceived close psychological distance when exposed to the servant robot than the partner robot ($M_{\text{partner}} = 3.50$, $SD = 0.98$; $M_{\text{servant}} = 4.70$, $SD = 1.36$; $p < 0.001$), while those with low-PDB perceived close psychological distance when they were exposed to the partner robot than the servant robot ($M_{\text{partner}} = 5.07$, $SD = 0.99$; $M_{\text{servant}} = 3.89$, $SD = 1.63$; $p < 0.001$) (see Fig. 2).

Subsequently, a 2 (robot role positioning: partner vs. servant) \times 2 (PDB: high vs. low) between-subjects ANOVA was conducted with brand evaluations as the dependent variable. The two-way interaction between robot role positioning and PDB was significant ($F(1,158) = 6.48$, $p < 0.001$). Contrast analyses revealed that in the high-PDB condition, compared with partner robots, brand evaluations using servant robots were more positive ($M_{\text{partner}} = 5.34$, $SD = 0.92$; $M_{\text{servant}} = 5.74$, $SD = 0.77$; $p = 0.04$). In the low-PDB condition, compared with servant robots, brand evaluations using partner robots were more positive ($M_{\text{partner}} = 5.94$, $SD = 0.53$; $M_{\text{servant}} = 5.19$, $SD = 1.17$; $p < 0.001$) (see Fig. 3). Thus, our findings suggest that, for consumers with high Power Distance Belief (PDB), service robots positioned as servants (vs. partners) result in more favorable brand evaluations. Conversely, service robots positioned as partners (vs. servants) produce more favorable brand evaluations for consumers with low PDB. These results support

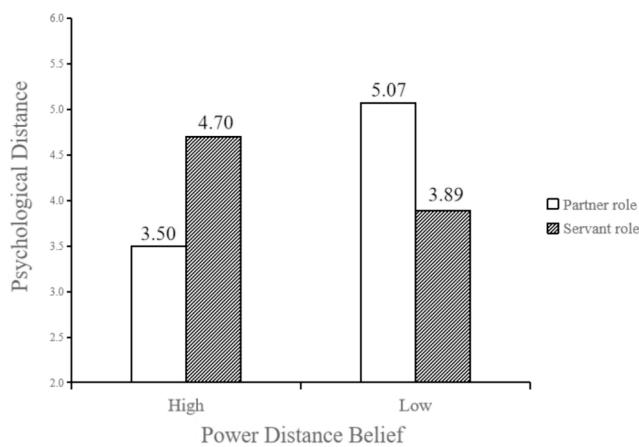


Fig. 2. The Interaction Effect of Robot Role Positioning and Power Distance Belief on Psychological Distance (Study 3).

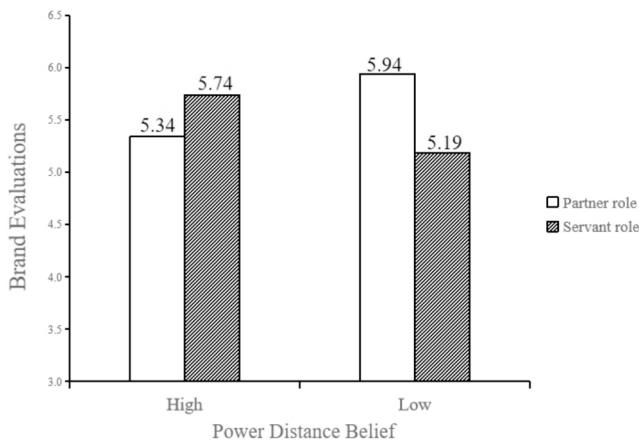


Fig. 3. The Interaction Effect of Robot Role Positioning and Power Distance Belief on Brand Evaluations (Study 3).

H3, H3a, and H3b, as Figs. 2 and 3 illustrate.

Power distance belief was then examined to determine whether it moderated the mediation role of psychological distance in the effect of robot role positioning on brand evaluations. A Model 7 in Hayes (2017) was employed to test this with 5000 resamples (Hayes, 2017). Robot role positioning was specified as the independent variable (code 0 = servant, 1 = partner), psychological distance as the mediator, PDB as the moderator (code 0 = low-PDB, 1 = high-PDB), and brand evaluation as the dependent variable. The results indicate that PDB moderated the effect of robot role positioning on brand evaluations. As anticipated, a significant index of moderated mediation confirmed the moderated mediation (index = -0.46, SE = 0.19, 95% CI = [-0.85, -0.13]). Specifically, psychological distance mediated the effect of robot role positioning on brand evaluations, whether in the high-PDB condition (β = -0.23, SE = 0.10, 95% CI = [-0.44, -0.07]) or the low-PDB condition (β = 0.23, SE = 0.11, 95% CI = [0.06, 0.47]). Psychological distance plays a mediating role in this process. In the high-PDB condition (β = -0.23), robot role positioning (0 = servant, 1 = partner) harms psychological distance (a_1 = -1.20, SE = 0.28, 95% CI = [-1.76, -0.65]). Psychological distance (1 = far, 7 = close) has a positive effect on brand evaluations (b = 0.19, SE = 0.05, 95% CI = [0.10, 0.29]), which means that for consumers with high-PDB, service robots positioned as servants (vs. partners) will reduce their psychological distance and lead to more favorable brand evaluations. While in the low-PDB condition (β = 0.23), robot role positioning (0 = servant, 1 = partner) has a positive effect on psychological distance (a_0 = 1.18, SE = 0.28, 95% CI = [0.62, 1.74]),

and psychological distance (1 = far, 7 = close) has a positive effect on brand evaluations (b = 0.19, SE = 0.05, 95% CI = [0.10, 0.29]), this result shows that for consumers with low-PDB, service robots positioned as partners (vs. servants) will reduce their psychological distance and lead to more favorable brand evaluations. In summary, the moderated mediation model was established, and these results also support H3, H3a, and H3b, as found in Fig. 4.

By choosing “LAO MIAO jewelry” as the brand in Study 3, versus “Dong Lai Shun” and “Go Believe” from Studies 1 and 2, the use of more than one industry (i.e., gold and food services, respectively) improves the external validity of our results. Findings from Study 3 suggest that PDB moderates the mediation role of psychological distance in the effect of robot role positioning on brand evaluations, confirming our H1, H2, and H3.

6. Study 4

To further explore boundary conditions, we investigated the interaction effect of robot role positioning and service type context to enrich our findings. As an application scenario for service robots, the service type is likely to influence the effect of robot role positioning on brand evaluations. Thus, Study 4 investigates the H4. The dependent variable is brand evaluation.

6.1 Pretest

This study used The British Museum as a time-honored brand in a different geographic setting than Studies 1–3. The British Museum has a long history that dates back to 1753 (The British Library, 2017). A pretest (N = 84) suggested that consumers’ familiarity ($M_{partner} = 4.69$, $SD = 1.35$; $M_{servant} = 4.86$, $SD = 1.35$; $t(82) = 0.56$, $p > 0.1$) between two robot role positionings were not significantly different.

The manipulation of robot role positioning was consistent with Study 2 and Study 3 (see Appendix D for the text descriptions and associated photos). To manipulate service type, we asked participants to imagine that they were going to visit the British Museum. In the hedonic service condition, participants are tourists intending to visit the British Museum for fun. In contrast, in the utilitarian service condition, participants read that they were art students going to visit the British Museum and collect academic materials for their thesis (Appendix E) (Botti & McGill, 2011; Blinda et al., 2019).

Then, a description of the museum visit process was provided to further enhance participants’ perception of robot role positioning and service type. Specifically, participants in the hedonic (utilitarian) service context read that the service robot “Zora” introduced them to entertaining (academic) information about the Portland Vase. In the partner positioning condition, “Zora” used a friendly tone to present the exhibits. In contrast, in the servant positioning condition, “Zora” adopted a humble tone similar to a servant’s (see Appendices F and G for text descriptions across all conditions).

To assess participants’ perceptions of service type (Voss et al., 2003; Liu et al., 2022), a 4-item 7-point scale was employed (e.g., -3 = More functional than enjoyable, 0 = Equally functional and enjoyable, 3 = More enjoyable than functional; $\alpha = 0.74$), with higher scores indicating a more hedonic service context. As expected, an independent sample t -test showed that manipulation of service type was successful ($M_{hedonic} = 1.32$, $SD = 0.94$; $M_{utilitarian} = -0.10$, $SD = 1.42$; $t(82) = 5.42$, $p < 0.001$).

Robot role perception was measured using a single-item 7-point scale (-3 = More like a servant than a partner, 0 = Equally like a servant and a partner, 3 = More like a partner than a servant). The result of a planned contrasts analysis confirmed that manipulation of robot role positioning was successful ($M_{partner} = 1.71$, $SD = 1.07$; $M_{servant} = -0.45$, $SD = 1.84$; $t(82) = 6.61$, $p < 0.001$).

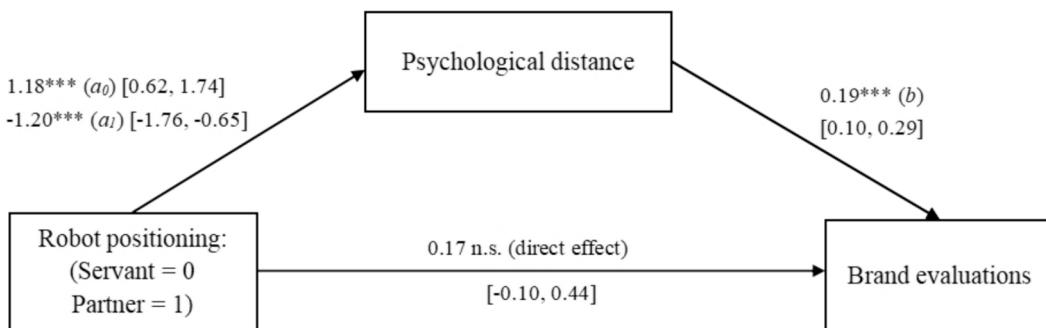


Fig. 4. Moderated Mediation Results (Study 3). Notes: Psychological distance mediated the effect of robot role positioning on brand evaluation, but that mediation was moderated by power distance belief in Study 3. The two effect values on the left of the figure indicate the conditional effects of robot role positioning on psychological distance at the low (a_0) and high (a_1) power distance belief. Bracketed numbers indicate 95% CIs. *** $p < 0.001$.

6.2 Study design and sample

Study 4 employed a 2 (robot role positioning: partner vs. servant) \times 2 (service type: hedonic vs. utilitarian) between-subjects design. One hundred eighty-nine participants were recruited online via the SOJUMP platform (82 men, $M_{age} = 31.8$).

6.3 Stimuli and procedures

The stimulus and manipulations of service type and robot role positioning are the same as in the pretest. At the beginning of the experiment, participants were introduced to The British Museum ("The British Museum, founded in 1753, is the world's oldest and most magnificent comprehensive museum"). Next, all participants are randomly assigned to one of four experimental conditions, where they read the introduction of the service robot "Zora" and the description of the service type context and museum visit process. Finally, participants were required to complete a questionnaire that included checks for manipulating robot role positioning and service type ($\alpha = 0.79$), measurements of brand evaluations ($\alpha = 0.72$), and demographic information.

6.4 Results and discussion

An independent sample t -test was conducted to check the manipulation of service type. The results showed that the manipulation was successful ($M_{\text{hedonic}} = 1.18$, $SD = 1.32$; $M_{\text{utilitarian}} = -0.12$, $SD = 1.30$; $t(187) = 6.80$, $p < 0.001$). The manipulation of robot role positioning was also checked with an independent sample t -test. The result suggested that the manipulation of robot role positioning was successful ($M_{\text{partner}} = 1.81$, $SD = 0.99$; $M_{\text{servant}} = -0.63$, $SD = 1.95$; $t(187) = 10.59$, $p < 0.001$).

We employed an ANOVA with brand evaluations as the dependent variable to analyze the interaction effect of robot role positioning and service type. The results showed a significant interaction between the robot role positioning and service type ($F(1, 185) = 16.07$, $p < 0.001$). Moreover, as expected, when robots are positioned as partners, participants have more favorable brand evaluations in hedonic than in utilitarian service contexts ($M_{\text{hedonic}} = 6.13$, $SD = 0.44$; $M_{\text{utilitarian}} = 5.67$, $SD = 0.60$; $p < 0.001$), whereas there is no difference between hedonic and utilitarian service contexts when robots positioned as servants ($M_{\text{hedonic}} = 5.44$, $SD = 0.72$; $M_{\text{utilitarian}} = 5.72$, $SD = 0.70$; $p > 0.05$). The interaction is depicted in Fig. 5.

The above results suggest that service type context interacts with robot role positioning on brand evaluations. Specifically, positioning service robots as partners (vs. servants) leads to more favorable brand evaluations in hedonic than utilitarian service contexts. However, when robots are positioned as servants, consumer brand evaluations have no significant difference, whether in hedonic or utilitarian service contexts.

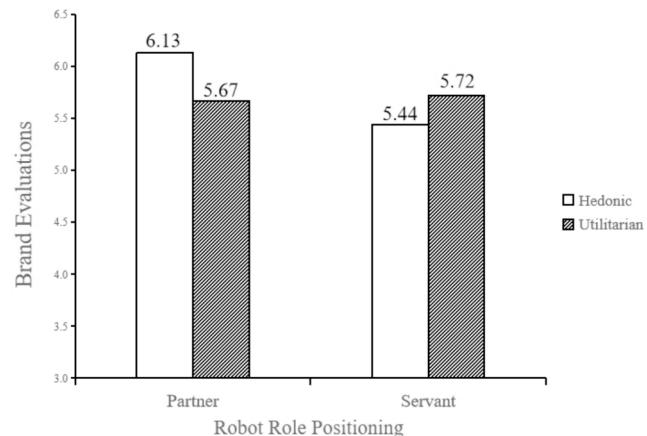


Fig. 5. The Interaction Effect of Robot Role Positioning and Service Type on Brand Evaluations (Study 4).

Finally, we provided all mean scores for all treatment cell and factor means, along with SDs and cell sample sizes in Table 1.

7. General discussion

In conclusion, the findings from the four studies presented in this paper provide strong evidence that positioning robots in different roles significantly impacts consumers' brand evaluations by affecting psychological distance. The findings suggest that robots positioned as partners will produce more favorable brand evaluations than robots positioned as servants. This effect is mediated by psychological distance, indicating that consumers' perceptions of the brand are influenced by their psychological proximity to the robot.

Moreover, the moderating effects of PDB and service type were examined, further expanding the applicability of the conceptual model. Consumers with high-PDBs were found to prefer robots positioned as servants (vs. partners), resulting in a closer psychological distance and more favorable brand evaluations. In contrast, consumers with low PDBs tend to perceive robots positioned as partners (vs. servants) as psychologically closer and thus evaluate the brand more favorably. Indeed, service-type context interacts with robot role positioning on brand evaluation. Specifically, when service robots are positioned as partners within the context of time-honored brands, it results in more favorable brand evaluations in a hedonic than utilitarian service context. However, this effect becomes insignificant when robots are positioned as servants. The results provide significant theoretical and managerial implications for related research and marketers in the industry.

Table 1

A Summary of All Mean Scores of Four Studies.

Study	Factor 1	Factor 2	Psychological distance	SD	Brand evaluation	SD	n
Study 1	Partner	—	—	—	6.00	0.48	64
	Servant	—	—	—	5.63	0.76	70
Study 2	Partner	—	5.79	0.81	6.24	0.44	70
	Servant	—	3.91	1.43	4.86	0.97	67
Study 3	Partner	High PDB	3.50	0.98	5.34	0.92	38
	Partner	Low PDB	5.07	0.99	5.94	0.53	43
	Servant	High PDB	4.70	1.36	5.74	0.77	44
	Servant	Low PDB	3.89	1.63	5.19	1.17	37
Study 4	Partner	Hedonic	—	—	6.13	0.44	48
	Partner	Utilitarian	—	—	5.67	0.60	40
	Servant	Hedonic	—	—	5.44	0.72	48
	Servant	Utilitarian	—	—	5.72	0.70	53

Note: This table reproduces the data found in Studies 1–4.

7.1 Theoretical contributions

This research makes valuable contributions to the literature on human-robot brand interactions by highlighting the impact of robot role positioning on brand evaluations and considering the moderating role of PDB and the service-type context in the research framework. This holds for time-honored brands that have longstanding historical and cultural influences.

First, the current research demonstrates that different service robot role positioning can significantly influence consumer brand evaluations. Increasing scholarship argues that service robots are not merely tools for providing services. They have the potential to serve as participants in social interaction and form different interpersonal relationships with consumers (Fong et al., 2003; Huang & Rust, 2018; Qiu et al., 2020). Our research complements the growing human-robot interaction literature by introducing the concept of service robot role positioning, specifically partner versus servant roles. It offers fresh insights into how consumers evaluate brands based on their perceptions of different robot role positions.

Further, our findings contribute to understanding the underlying mediating mechanisms of the interaction between robots and consumers. Existing studies have proposed various robot-related mediators, such as animacy, intelligence, likability, and safety (Bartneck et al., 2009), or have examined the usefulness and ease from the perspective of technology acceptance (Davis et al., 1989). In a departure from the mainstream understanding in this line of inquiry, the current research adopts a social interaction perspective and investigates psychological distance as a mediator. Although psychological distance has been extensively studied in anthropomorphism literature, there is a relative lack of research in human-robot interaction literature, especially how robots with different levels of psychological closeness can affect consumers' attitudes and evaluations.

This research also extends the understanding of human-robot interaction by uncovering how consumers' PDBs affect their perceptions of service robots, influencing brand evaluations. Existing research on partner and servant roles mainly focuses on how consumers view themselves and others. For example, materialists respond more favorably to servant brands than partner brands (Kim & Kramer, 2015), and consumers with interdependent (vs. independent) self-construal prefer partner (vs. servant) brands (Hsieh et al., 2021). However, this research neglected the power disparity implied in partner and servant roles and relationships (Kim & Kramer, 2015; Han et al., 2019). Our findings demonstrate that consumers with different PDBs have different psychological preferences for partner and servant roles, highlighting the significance of the power structure between consumers and robot roles.

Considering the widespread application of service robots in service

contexts, our study examines the moderating effect of service types. Unlike previous research that focused on a single service context, such as critical services like banking (Belanche et al., 2020), our research extends the investigation to different service contexts. We demonstrate that using service robots with varying role positioning in hedonic and utilitarian service types can impact consumers' brand perceptions. This finding provides valuable theoretical insights for future research on service types and the adoption of service robots. By considering a broader range of service contexts, our study contributes to a more comprehensive understanding of the complex dynamics between service robots, consumer behavior, and brand perception.

These contributions deepen our knowledge of the complex dynamics between robots, consumers, and brands, offering theoretical implications for designing and brand marketing in human-robot interaction.

7.2 Practical implications

This research has practical implications for brand managers regarding the application of partner or servant robot roles in brand positioning strategies. Brand managers can leverage the findings to inform their use of service robots and brand marketing.

Numerous brands globally are experiencing a decline due to technological advancements outpacing their development, slow product innovation, inflexible brand culture, and outdated operational models. Consequently, the diminishing brand value and waning market recognition have increased brand aging (Balmer & Chen, 2015). This paper can guide brand managers who wish to use service robots to enhance their vitality. By strategically positioning robots in different roles, brand managers can cater to the diverse needs of various situations. Our research indicates that positioning service robots as partners can deliver high-quality products and services effectively.

Considering the diverse range of products and services offered, managers must determine the appropriate robot role positioning based on the brand's setting. Positioning service robots as partners for hedonic services such as restaurants can enhance the overall consumer experience and positively influence brand perceptions. On the other hand, for brands providing utilitarian services, such as banks, the robot role positioning should be aligned with the functional and task-oriented nature of these services.

Furthermore, store brand managers should consider the PDBs of their target customers when designing and positioning robots. Since different robot roles can lead to different perceived psychological distances, managers should be more attentive to those with high-PDBs. When brands use robots to provide services to such consumers, they must position robots as servants to obtain better brand evaluations. The findings of this paper regarding the PDB can also be applied to brand

communication. When brands need to enter foreign markets, considering the cultural background of consumers and selecting robot role positioning is necessary, as robot positioning that aligns with local consumers' PDBs can bring better brand evaluations.

By strategically incorporating service robots, considering the psychological distance, and accounting for consumers' PDBs, brand managers can effectively leverage these insights to optimize brand positioning and create positive consumer experiences.

7.3 Limitations and future research

The findings of this research are subject to certain limitations, which present opportunities for future research. Firstly, the conclusions of this research used experiments to manipulate stimuli and collected data through online questionnaires. Future research could explore alternative approaches, such as text-mining techniques. Researchers could collect vast amounts of online opinions about consumers' perceptions of service robots using techniques such as web scraping and social network application programming interfaces (APIs) to learn about the effects of service robot role positioning on consumer brand evaluations. Additionally, future studies could expand on the methodology by incorporating more partner or service traits in the presentation of service robots. This could involve the inclusion of associated words (e.g., warmth and competence) and variations in the presentation of these words (e.g., uppercase vs. lowercase letters) to describe the robot roles (servant and partner) (Teng et al., 2021).

Secondly, this research solely focused on the effect of robot role positioning, leaving room for future studies to investigate other robot-related elements. For example, some scholars have found that although people prefer human-like robots that serve in social roles, they prefer machinelike robots for more investigative roles, such as lab assistants (Goetz et al., 2003). Therefore, future research could explore additional factors influencing people's preferences for robot roles. Finally, future studies could consider brand-related elements, such as brand image (prestigious vs. popular). Past studies have shown that

prestigious brands are often associated with long distances; therefore, such brands may be more suitable for using robots positioned as servants. In contrast, popular brands are frequently linked to closer psychological distance and social closeness, potentially making robots placed in partner roles a more suitable choice (Chu et al., 2021). Moreover, while this paper specifically examined the effect of robot role positioning on time-honored brands, future research could replicate our experiments in emerging brand contexts, thereby offering insights into the role of robot positioning in different brand contexts.

8 Notes.

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CRediT authorship contribution statement

Lefa Teng: Visualization, Supervision, Resources, Methodology, Funding acquisition, Conceptualization. **Chuluo Sun:** Writing – original draft, Project administration, Formal analysis, Data curation. **Yifei Chen:** Visualization, Methodology, Data curation. **Michael W. Lever:** Writing – review & editing, Visualization. **Lianne Foti:** Writing – review & editing, Visualization, Resources.

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.

Data availability

Data will be made available on request.

Appendix A. Pictures used in Study 1 (English translation version)

Partner Robot Condition



Servant Robot Condition



Appendix B. Text descriptions and pictures used in Study 2 (English translation version)

Partner Robot Condition

Recently, the well-known time-honored brand “Go Believe” adopted the latest intelligent service robot “Tangbao”.

According to the manager of “Go Believe”, “Tangbao” can recommend dishes to customers and ask customers about their tastes and taboos as the most intimate partner. The manager said: “we hope that Tangbao can become a good partner of customers and create a pleasant dining experience with customers”.



Servant Robot Condition

Recently, the well-known time-honored brand “Go Believe” adopted the latest intelligent service robot “Tangbao”.

According to the manager of “Go Believe”, “Tangbao” can recommend dishes to customers and ask customers about their tastes and taboos as the most loyal servant. The manager said: “we hope that Tangbao can become a good servant of customers and provide a pleasant dining experience for customers”.



Appendix C. Text descriptions and pictures used in Study 3 (English translation version)

Partner Robot Condition

Recently, LAO MIAO jewelry has used the intelligent service robot "Xiubao" to play the role of "smart store assistant".

Xiubao can recommend the latest products to customers like the most intimate partner and patiently listen to customers' demands. Xiubao will create a happy shopping experience with customers.



Servant Robot Condition

Recently, LAO MIAO jewelry has used the intelligent service robot "Xiubao" to play the role of "smart store assistant".

Xiubao can recommend the latest products to customers like the most loyal servant and patiently listen to customers' demands. Xiubao will provide a happy shopping experience for customers.



Appendix D. Text descriptions and pictures used in Study 4 (English translation version)

Partner Robot Condition

The British Museum with a long history uses the latest intelligent service robot "Zora" to guide visitors.

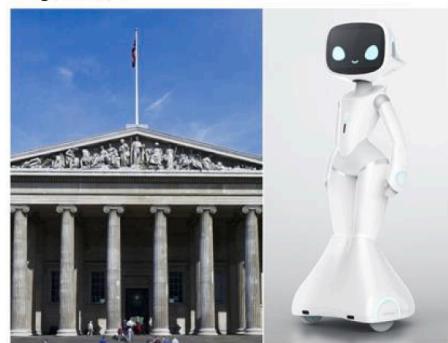
"Zora" can interact with visitors like the most intimate partner, patiently introducing exhibits, answering questions, and co-creating a satisfying tour experience with visitors.



Servant Robot Condition

The British Museum with a long history uses the latest intelligent service robot "Zora" to guide visitors.

"Zora" can interact with visitors like the most loyal servant, patiently introducing exhibits, answering questions, and providing visitors with a satisfying tour experience.



Appendix E. Text descriptions about service types used in Study 4 (English translation version)

Hedonic Service Condition

Please imagine: as a tourist, you are going to visit the British Museum and have fun. Next you will see the conversation and interaction with the intelligent service robot "Zora" during your visit.

Utilitarian Service Condition

Please imagine: as an art student, you are going to visit the British Museum and gather material for your thesis. Next you will see the conversation and interaction with the intelligent service robot "Zora" during your visit.

Appendix F. Text descriptions in hedonic service condition used in Study 4 (English translation version)

Partner-hedonic Condition	Servant-hedonic Condition
<p>Next, envision this scenario: you enter the British Museum for a visit and engage in the ensuing dialogue with the intelligent service robot "Zora."</p> <p>Zora: Hello, welcome to the British Museum. I am the latest intelligent service robot "Zora" of the British Museum. I am your most intimate partner. Today I will guide you to visit the British Museum.</p> <p>Zora: During the tour, I will introduce the exhibits and we can interact with each other at any time. I hope we can create a satisfying experience together. The journey is about to begin. Are you ready?</p> <p>You: Ready, let's get started.</p> <p>After a period of sightseeing, you follow Zora to the Department of Greek and Roman Antiquities.</p> <p>Zora: My friend, this is the Portland vase. It is one of the finest extant Roman stone glass objects and one of the main treasures of the British Museum.</p> <p>You: Zora, what was the use of the Portland vase?</p> <p>Zora: Okay, my friend, I'll answer this question. Experts speculate that the Portland vase was a gift from an ancient Roman emperor to a nobleman and was the most luxurious item that nobleman had ever owned, it's a symbol of his status.</p> <p>You: I see. Thank you Zora.</p> <p>Through this visit, you have seen historical relics, increased knowledge and gained happiness.</p> <p>You: Thanks Zora, I had a great time today.</p> <p>Zora: You're welcome, my friend. All the best! Bye!</p>	<p>Next, envision this scenario: you enter the British Museum for a visit and engage in the ensuing dialogue with the intelligent service robot "Zora."</p> <p>Zora: Hello, welcome to the British Museum. I am the latest intelligent service robot "Zora" of the British Museum. I am your most loyal servant. Today I will guide you to visit the British Museum.</p> <p>Zora: During the tour, I will introduce the exhibits and we can interact with each other at any time. I hope I can provide you with a satisfying experience. The journey is about to begin. Are you ready?</p> <p>You: Ready, let's get started.</p> <p>After a period of sightseeing, you follow Zora to the Department of Greek and Roman Antiquities.</p> <p>Zora: My master, this is the Portland vase. It is one of the finest extant Roman stone glass objects and one of the main treasures of the British Museum.</p> <p>You: Zora, what was the use of the Portland vase?</p> <p>Zora: Okay, my master, I'll answer this question. Experts speculate that the Portland vase was a gift from an ancient Roman emperor to a nobleman and was the most luxurious item that nobleman had ever owned, it's a symbol of his status.</p> <p>You: I see. Thank you Zora.</p> <p>Through this visit, you have seen historical relics, increased knowledge and gained happiness.</p> <p>You: Thanks Zora, I had a great time today.</p> <p>Zora: You're welcome, my master. I wish you all the best! Bye!</p>
<p>Next, envision this scenario: you enter the British Museum for a visit and engage in the ensuing dialogue with the intelligent service robot "Zora."</p> <p>Zora: Hello, welcome to the British Museum. I am the latest intelligent service robot "Zora" of the British Museum. I am your most intimate partner. Today I will guide you to visit the British Museum.</p> <p>Zora: During the tour, I will introduce the exhibits and we can interact with each other at any time. I hope we can create a satisfying experience together. The journey is about to begin. Are you ready?</p> <p>You: Ready, let's get started.</p> <p>After a period of sightseeing, you follow Zora to the Department of Greek and Roman Antiquities.</p> <p>Zora: My friend, this is the Portland vase. It is one of the finest extant Roman stone glass objects and one of the main treasures of the British Museum.</p> <p>You: Zora, what does the pattern on the Portland vase mean?</p> <p>Zora: Okay, my friend, I'll answer this question. There are seven figures carved on the body of the Portland vase, but only one of them can be identified as Cupid, and scholars have offered more than 50 different interpretations of the image on the vase.</p> <p>You: I see. Thank you Zora.</p> <p>Through this visit, you have seen historical relics, increased your knowledge, and collected materials for thesis.</p> <p>You: Thanks Zora, I learned a lot today..</p> <p>Zora: You're welcome, my friend. All the best! Bye!</p>	<p>Next, envision this scenario: you enter the British Museum for a visit and engage in the ensuing dialogue with the intelligent service robot "Zora."</p> <p>Zora: Hello, welcome to the British Museum. I am the latest intelligent service robot "Zora" of the British Museum. I am your most loyal servant. Today I will guide you to visit the British Museum.</p> <p>Zora: During the tour, I will introduce the exhibits and we can interact with each other at any time. I hope I can provide you with a satisfying experience. The journey is about to begin. Are you ready?</p> <p>You: Ready, let's get started.</p> <p>After a period of sightseeing, you follow Zora to the Department of Greek and Roman Antiquities.</p> <p>Zora: My master, this is the Portland vase. It is one of the finest extant Roman stone glass objects and one of the main treasures of the British Museum.</p> <p>You: Zora, what does the pattern on the Portland vase mean?</p> <p>Zora: Okay, my master, I'll answer that question. There are seven figures carved on the body of the Portland vase, but only one of them can be identified as Cupid, and scholars have offered more than 50 different interpretations of the image on the vase.</p> <p>You: I see. Thank you Zora.</p> <p>Through this visit, you have seen historical relics, increased your knowledge, and collected materials for thesis.</p> <p>You: Thanks Zora, I learned a lot today..</p> <p>Zora: You're welcome, my master. I wish you all the best! Bye!</p>

Appendix G. Text descriptions in utilitarian service condition used in Study 4 (English translation version)

Partner-utilitarian Condition	Servant-utilitarian Condition
<p>Next, envision this scenario: you enter the British Museum for a visit and engage in the ensuing dialogue with the intelligent service robot "Zora."</p> <p>Zora: Hello, welcome to the British Museum. I am the latest intelligent service robot "Zora" of the British Museum. I am your most intimate partner. Today I will guide you to visit the British Museum.</p> <p>Zora: During the tour, I will introduce the exhibits and we can interact with each other at any time. I hope we can create a satisfying experience together. The journey is about to begin. Are you ready?</p> <p>You: Ready, let's get started.</p> <p>After a period of sightseeing, you follow Zora to the Department of Greek and Roman Antiquities.</p> <p>Zora: My friend, this is the Portland vase. It is one of the finest extant Roman stone glass objects and one of the main treasures of the British Museum.</p> <p>You: Zora, what does the pattern on the Portland vase mean?</p> <p>Zora: Okay, my friend, I'll answer this question. There are seven figures carved on the body of the Portland vase, but only one of them can be identified as Cupid, and scholars have offered more than 50 different interpretations of the image on the vase.</p> <p>You: I see. Thank you Zora.</p> <p>Through this visit, you have seen historical relics, increased your knowledge, and collected materials for thesis.</p> <p>You: Thanks Zora, I learned a lot today..</p> <p>Zora: You're welcome, my friend. All the best! Bye!</p>	<p>Next, envision this scenario: you enter the British Museum for a visit and engage in the ensuing dialogue with the intelligent service robot "Zora."</p> <p>Zora: Hello, welcome to the British Museum. I am the latest intelligent service robot "Zora" of the British Museum. I am your most loyal servant. Today I will guide you to visit the British Museum.</p> <p>Zora: During the tour, I will introduce the exhibits and we can interact with each other at any time. I hope I can provide you with a satisfying experience. The journey is about to begin. Are you ready?</p> <p>You: Ready, let's get started.</p> <p>After a period of sightseeing, you follow Zora to the Department of Greek and Roman Antiquities.</p> <p>Zora: My master, this is the Portland vase. It is one of the finest extant Roman stone glass objects and one of the main treasures of the British Museum.</p> <p>You: Zora, what does the pattern on the Portland vase mean?</p> <p>Zora: Okay, my master, I'll answer that question. There are seven figures carved on the body of the Portland vase, but only one of them can be identified as Cupid, and scholars have offered more than 50 different interpretations of the image on the vase.</p> <p>You: I see. Thank you Zora.</p> <p>Through this visit, you have seen historical relics, increased your knowledge, and collected materials for thesis.</p> <p>You: Thanks Zora, I learned a lot today..</p> <p>Zora: You're welcome, my master. I wish you all the best! Bye!</p>

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