Social Crowding Versus Spatial Crowding: Differential Influences on Customers' Preference For Anthropomorphized Self-Service Technologies

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We predict that customers are less likely to prefer anthropomorphized self-service technologies when they attribute the crowded environment to social reasons rather than spatial reasons due to a social withdrawal tendency. We test our predictions with a pilot study and four experiments, including a field experiment with actual transactional data.

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Beyond the Negative Consequences of Crowding: New Psychological Processes and Behavioral Outcomes
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Paper #1: The Influence of Social Crowding on Creativity
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Paper #2: The Upside of Social Crowding on Consumer Product Preference
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Paper #3: The Impact of Crowding on Calorie Consumption
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Paper #4: Social Crowding versus Spatial Crowding: Differential Influences on Customers’ Preference for Anthropomorphized Self-Service Technologies
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SESSION OVERVIEW
As the population continues to grow, the world is becoming ever more crowded. Although there is an emerging body of research on crowding in marketing, the majority of it conceptualizes the impact of crowding in terms of various forms of defensive response from the consumer. For example, socially or spatially crowded stores lead to stress (Epstein 1981), an early exit from the store (Eroglu, Machleit, and Barr 2005), a perceived lack of control (Levav and Zhu 2009), and a preference for safety oriented products (Maeng, Tanner, and Soman 2013). In this session, we aim to broaden our understanding of crowding by bringing together four papers exploring new psychological processes and behavioral outcomes. In particular, collectively, the four papers ask if crowding can influence consumer thinking style, and how might this impact behavior and preference?

The first paper by Maeng, Tanner and Wu extends current understanding of crowding by examining its impact on creative performance. Across five experiments, they demonstrate that as individuals become more crowded they increasingly perform worse on creativity tasks. The authors demonstrate that this relationship between crowdingness and creative performance is moderated by crowd composition and an individual’s need for arousal, and attenuated for sensation seekers and for crowds perceived positively.

Shifting attention from cognition to product choice, the second and third paper investigate how crowding in a retail setting influences consumer preference. By using both secondary retail data and experimental design, Ding and Zou show that when consumers are a priori motivated to purchase from a product class, shopping in the crowded (vs. uncrowded) store will make them infer the overall availability of product supply as low and thus increase sales of the most-preferred items. Hock and Bagchi explore consumers’ food consumption in crowded versus uncrowded contexts. Their findings suggest that crowding evokes more defensive processing because of distraction and consequently makes individuals consume more calories. They also demonstrate that asking participants to focus on rational thoughts could attenuate the effect of crowding on calorie consumption.

Finally, Zou, Wan, and Yim differentiate social crowding from spatial crowding and test the differential effects on consumers’ adoption of anthropomorphized self-service technologies (SSTs). Specifically, they find that anthropomorphized SSTs could help restore control and will be more effective when consumers attribute crowding to spatial reasons. In contrast, when consumers attribute crowding to social reasons, anthropomorphized SSTs will be less effective due to social withdrawal tendency.

To summarize, this set of four papers identifies multiple new insights and novel psychological processes resulting from crowding in a variety of different contexts. We believe this session will attract audiences from diverse background including researchers interested in crowding, consumer cognition, information processing, decision-making, food consumption, and creativity. Findings discussed in this session will advance knowledge about consequences of crowding in retail settings. In addition, we aim to facilitate connections with marketing practice by presenting four papers that are managerially relevant. We also hope that this session will promote future research that could improve our understanding of service management in crowded retail settings.

The Influence of Social Crowding on Creativity
EXTENDED ABSTRACT
Recent research has revealed a wide variety of psychological consequences of being crowded. In this research, we built on the recent findings that being crowded moderates attentional scope and construal level (Maeng and Tanner 2013) and investigated whether social crowdingness might influence an individual’s creative performance. In particular, we explored 1) whether being crowded reduces creativity, 2) whether an individual’s threshold for arousal activation moderates the influence of social crowding on creative performance, and 3) whether the ways in which crowds are perceived negatively or positively moderates this effect. Our core hypothesis was that, as attentional scope narrows in crowded environments, individuals perform worse on creativity tasks. However, when the crowded individual is sensation seekers or when the crowds are perceived positively, the negative effect of crowding on creativity disappears. We tested these hypotheses in four studies.

Study 1 tested the basic relationship between crowdedness and creative performance. Students participated in the study for extra credit (n = 193). In identical rooms, participants were randomly assigned to either crowded (25 participants invited) or uncrowded (3 participants invited) sessions. Creativity was tested using the Guilford “brick uses and consequences” test (Friedman and Forster 2001) with limited time given. As predicted, the participants in the less crowded room generated a greater number of unusual uses of bricks (M = 5.7) compared to those in the crowded classroom (M = 4.8, t(191) = -2.21, p < .03). Moreover, coding use uniqueness on a 1-10 scale revealed that ideas in the less crowded room were also more unique (M = 6.1) compared to those from the crowded room (M = 5.6, t(191) = -4.74, p < .001).

Study 2 was designed to replicate this core result using a different task. Participants (n=159) were once again assigned to either a crowded or uncrowded room as in Study 1. Creativity was measured...
using an insight problem-solving task, the “pig in the pen” problem (Scholer, Ohlsson, and Brooks 1993). It presents participants with an illustration of nine pigs in a single square pen, and challenges them (inside 3 minutes) to place them all in individual pens by drawing two additional squares. Consistent with our prediction, participants in crowded rooms were less likely solve the problem (5%) than participants in uncrowded rooms (13%; $\chi^2_{10} = 4.18, p < .03$).

The goal of Study 3 was to explore the potential moderating effect of crowd composition. Specifically, we were interested in whether the reduced avoidance motivations invoked by in-group (vs. out-group) crowds would result in an attenuation of the negative effect of crowding on creativity. The study was 2 (crowdedness: crowded vs. uncrowded) x 2 (group identity: in-group vs. out-group) between subject design. Group identity was manipulated using a dot estimation task which has been shown to reliably manipulate group identity (Tajfel et al. 1971). Creativity was measured using the Remote Associates Test (RAT; Mednick 1962). Participants (n=94) were given 15s to respond to each of seven problems. An ANOVA on total RAT score yielded a marginally significant interaction between crowdedness and group membership ($p = .07$). Specifically, when the crowd was comprised of out-group members, participants scored significantly lower in the crowded ($M = .19$) than the uncrowded condition ($M = .68, p < .03$). However, when the scene contained in-group members, no difference in RAT score emerged across the crowdedness conditions ($F < 1$).

Study 4 was designed to explore the potential moderating effect of individual differences in stimulation and arousal needs. Researchers have suggested that high sensation seekers (high need for arousal) reduce the intensity of an incoming stimulus, whereas low sensation seekers (low need for arousal) augment the intensity of the stimulus. Thus, we posited that sensation-seeking tendencies should moderate the influence of crowding on creativity. In particular, individuals who have a low need for arousal show reduced creative performance under crowding, whereas the creative performance of those with a high need for arousal are not much influenced by social crowding. The study was a 2 (crowdedness: crowded vs. uncrowded) x 2 (arousal need: high vs. low) between subject design (n=75). Crowding was manipulated using a picture priming task and creativity was measured with the RAT used in study 3. The sensation seeking scale was administered to measure individual differences in stimulation and arousal needs (Zuckerman et al., 1978). An ANOVA on a total RAT score yielded a significant interaction between crowdedness and sensation seeking ($p < .01$). Specifically, when an individual is low sensation seeking (low need for arousal), participants scored significantly lower in the crowded ($M = 1.0$) rather than uncrowded conditions ($M = 2.28, p < .005$). However, when individuals that are high sensation seeking (have a high need for arousal), there was no difference in the RAT score that emerged across the crowdedness conditions ($F < 1$).

Study 5 explored the role of arousal and valence for the Study 3 findings. Participants (n=109) were first presented with a picture of either a crowded or uncrowded scene before being instructed to visualize and describe how they would feel if they were in the scene. These descriptions were later coded for evidence of expressed arousal (activated vs. deactivated) and valence (positive vs. negative). Participants next conducted the RAT as in Study 3. Participants in the crowded condition expressed significantly more activation than those in the uncrowded condition ($p < .001$). An ANOVA on the total RAT score yielded a marginally significant interaction between valence and arousal ($p = .09$). Results showed that participants reported greater arousal and scored more on the RAT when crowding is perceived as positive ($M = 2.67$) rather than negative ($M = 1.66, p < .05$). However, no such differences were found among the participants who reported less activation ($F < 1$). Thus, Study 5 evidences that it is the type of arousal that is activated by social crowding that moderates creative performance.

In conclusion, our research demonstrated the ways in which social crowdedness influence creative performance. Our research has significant implications in many domains including team sizes for new product design or the potential impact of class size on student creativity in educational settings.

The Upside of Social Crowding on Consumer Product Preference

EXTENDED ABSTRACT

Suppose you decide to purchase a “Holiday Truffle Special Box” from a local dessert store that is currently promoting this special box at a discounted price. When you enter the store on your way home, you notice that the store is crowded with consumers. Will this feeling of crowding influence what trifles you choose to include in the special box? Building on the inference making literature (Fantz 1963; Kardes, Posavac and Cronley 2004), the current research aims to investigate how does social crowding affect consumers’ inference about the overall availability of the product class they intend to purchase from, and its consequence on product preference.

Social crowding is ubiquitous in a retail setting. Prior investigations of social crowding caused by higher level of consumer density have mainly demonstrated its negative affective and behavioral outcomes. For instance, previous literature suggests that social crowding activates an avoidance system (Maeng, Tanner and Soman 2013), leads consumers to infer lower social status of other shoppers at the store (O’Guinn, Tanner, and Maeng 2015), increases likelihood of earlier departure from the store (Hui and Bateson 1991) and decreases overall customer satisfaction (Eroglu, Machleit, and Barr 2005; Machleit, Eroglu, and Mantel 2000).

However, a hitherto unanswered question is whether the detrimental impact of social crowding on consumer preference prevails when consumers are a priori motivated to purchase from a product class. We propose that in such situations, social crowding as a salient cue in the retailing environment, can serve as an inferential cue to guide consumers’ choices from a product class they intend to purchase from and that their impact on product choices is mediated by perceived availability of the featured product category. Because high level of customer density often correlates with high demand and low supply, we argue that when consumers are motivated to make a choice among multiple alternatives from a product class, social crowding in a retail store can lead consumers to infer the overall availability of the product class they intend to purchase from as low. As a consequence, feeling socially crowded will increase the choice share of consumers’ favorite item, while broadening the discrepancy between the liking of their most-preferred and less-preferred alternatives. We further investigate three managerially relevant moderators that may attenuate the inferential effect of social crowding on product preference, that is, 1) product supply quantity, 2) inventory replenishment, and 3) assortment size.

A set of five experiments was conducted to investigate these assertions. In Study 1, we employed one secondary retail data to provide initial empirical evidence of social crowding effect on product preference. Among 204 transactions made by real consumers in a café, we differentiated the transactions completed in rush hours and non-rush hours. The results suggest that the market share of best-selling items was significantly higher in the rush hours than in non-rush hours.
Study 2 replicated the findings of Study 1 in a laboratory setting and explored the underlying process by using a 2 (social crowding: crowded vs. uncrowded) between-subjects design. We collected data of this study in the week before Mid-autumn Festival in China. The participants first ranked five mooncake flavors based on their own preference. Then we instructed the participants to imagine shopping in one shop for mooncakes. In the crowded condition, the shop image included twenty consumers. In the uncrowded condition, the shop image only included two consumers with the same display. The participants were further told the shop carried a total of five different mooncake flavors that have been ranked in the beginning of the study and they decided to purchase one mooncake box by selecting and putting four mooncakes into it. As predicted, participants incorporated a significantly higher proportion of their favorite mooncake flavor in crowded condition than in uncrowded condition. And this effect was mediated by perceived availability of supply level about mooncakes.

Across Studies 3-5, we consistently found that social crowding could boost sales consumers’ favorite item from a product class when the overall product supply was perceived as depletable. Study 3 manipulated actual product supply quantity and the results suggested that when the actual product supply quantity is not low, consumers exhibited a greater preference for the favorite item in crowded versus uncrowded condition. Conversely, when the actual product supply quantity is low, consumers always preferred for the favorite option, no matter whether the store is crowded or not.

Study 4 validated that inventory replenishment moderated the impact of social crowding on inferred product availability and consumers’ choices from a product class. For depletable products, feeling socially crowded (vs. uncrowded) in a shopping context made consumers infer product availability as low, thus enhanced the choice of favorite item. However, when the product inventory was expected to be replenished on a daily basis, social crowding in a shopping context did not influence the inference about product availability and consumer preference.

Study 5 examined the moderating role of assortment size. We found the inferential impact of social crowding on perceived product availability and product choices held when the assortment size was small. However, this impact was alleviated when the retail store offered large assortment size for a product category that consumers intended to purchase from.

To conclude, this research provides novel insights into the upside of social crowding on consumer product preference. In addition, the findings of current research shed new light on the inference making literature by identifying social crowding as an important contextual factor affecting consumer perception of product availability and by providing managerially relevant factors that may moderate the downstream consequences of social crowding on consumers choices.

**The Impact of Crowding on Calorie Consumption**

**EXTENDED ABSTRACT**

Imagine it is noon now and you decided to buy lunch at a local restaurant. You walk into the restaurant and find it crowded. Would the level of crowding influence your calorie consumption? Why?

Human crowding is defined as a “group of people gathered together such that the likelihood of an individual’s personal space being violated is significantly increased” (Maeng, Tanner, and Soman 2013, 740). In five studies, we demonstrate that crowding leads to higher calorie consumption, because it increases distraction, which hampers cognitive thinking and evokes more affective processing. When consumers process information affectively, they consume more calories. Thus, we show that when given a choice between several different options from a menu, people select higher-calorie items. Furthermore, when presented with only one option (e.g., trail mix), people eat more of the same food item. Across all our studies, we also rule out differences in specific emotions, actual and anticipated hunger, quality perceptions, explicit scarcity-based beliefs, age, gender, BMI, and dieting behavior.

In Study 1A we use secondary data from a well-known fast food restaurant and analyze 4,730 orders during a regular week (8 a.m. - 9 p.m.). The number of orders in each 10-minute (e.g., 8:00:8:10 a.m.) and 20-minute (e.g., 8:00:8:20 a.m.) interval served as a continuous measure of crowding. A main effect of crowding emerged in both regressions (10-minute: $B = 2.81, F(1, 4727) = 4.47, p < .04$; 20-minute: $B = 1.41, F(1, 4727) = 3.91, p < .05$), controlling for hour and weekday. Other ways of looking at the data (e.g., comparing the busiest with the least busy day, isolating lunch times; eliminating outliers) elicit similar results.

In Study 1B we conduct a survey ($N = 97$) at the same restaurant during lunch hours on days that are either more or less crowded. Participants in the crowded condition not only ordered more food ($M_{more\_crowded} = 1,059$ cal, $SD = 372$ vs. $M_{less\_crowded} = 887$ cal, $SD = 887$), but they also consumed more ($M_{more\_crowded} = 1,036$ cal, $SD = 375$ vs. $M_{less\_crowded} = 874$ cal, $SD = 303$; $F(1, 89) = 5.44$, $p = .02$). A sequential mediation revealed that consumption was significantly mediated by distraction and processing in sequence (95% CI: .34, 22.08). In study 2 we manipulate crowding in the laboratory and engage participants in a taste test ($N = 115$). We show that the effects not only emerge when a large number of people aggregate, but also when fewer people are in close proximity. Participants in the higher density conditions—more crowding ($M = 30.25$ grams, $SD = 19.13$) and dense less-crowding ($M = 28.14$ grams, $SD = 20.82$)—consumed similar amounts of trail mix ($F(1, 70) = .08$, $p = .78$), and these were significantly higher than the sparse less-crowded condition ($M = 18.09$ grams, $SD = 17.87$; respectively $F(1, 68) = 6.38$, $p < .03$ and $F(1, 63) = 3.92$, $p = .05$). We also replicate the mediation results of Study 1B.

In study 3 ($N = 107$) we demonstrate that merely evoking a crowded mindset can cause the effect. We showed participants a picture of a non-restaurant scenario that was either more or less crowded, and asked them to imagine being in that scenario. Next, in a purportedly unrelated study, we asked participants to select food from a restaurant’s menu. As expected, participants selected food with more calories in the crowded mindset condition ($M_{more\_crowded} = 988$ cal, $SD = 549$ vs. $M_{less\_crowded} = 784$ cal, $SD = 385$; $F(1, 102) = 5.09$, $p < .03$). Lastly, in Study 4 ($N = 108$) we employed a 2 (crowding: less, more) x 2 (processing: affective, cognitive) between-subjects design, and demonstrate an approach to attenuate consumption in crowded environments. Participants engaged in another taste test in a room that was either crowded or not. In the affective (cognitive) condition, we asked participants to focus on their emotional reactions (rational thoughts). A significant two-way interaction emerged ($F(1, 101) = 4.53$, $p < .04$). In the affective condition, participants ate more trail mix when the room was crowded ($M_{more\_crowded} = 44.93$ grams, $SD = 20.15$ vs. $M_{less\_crowded} = 30.33$ grams, $SD = 23.07$; $F(1, 49) = 5.46$, $p = .03$), while no such differences emerged in the cognitive condition ($M_{more\_crowded} = 21.63$ grams, $SD = 17.72$ vs. $M_{less\_crowded} = 21.13$ grams, $SD = 18.34$; $F(1, 49) = .02$, $p = .88$).

We make several theoretical contributions. We extend the prominent literature on retail atmospherics, which has mostly focused on the effects of subtle cues, such as temperature, color, lighting, or sound. Human crowding, on the other hand, is an omnipresent...
factor, but has received relatively little attention. We also show how crowding-induced distractions affect consumption decisions.

Our findings also have practical implications. Obesity is a major problem in most industrialized societies with significant associated medical expenses. Increases in consumption is one of the main drivers of obesity (Chandon and Wansink 2007). Increasing the space of restaurants or food courts could reduce consumers' perceived crowding, which in turn might decrease the risk of overeating. Additionally, as we find, merely evoking a crowded mindset can influence consumption. Therefore, from a public policy standpoint, it may be useful to use language that makes people feel more in control of their minds before ordering from a menu. Perhaps evoking a more cognitive frame of mind might help lower calorie consumption. Our findings are especially important given that the world’s population reached a staggering seven billion in 2007, and is steadily on the rise (United States Census Bureau). Global urbanization will unavoidably increase crowding in public consumption settings. Thus, a better understanding of how crowding impacts food consumption decisions may provide one avenue for a healthier lifestyle.

Social Crowding versus Spatial Crowding: Differential Influences on Customers' Preference for Anthropomorphized Self-Service Technologies

EXTENDED ABSTRACT

Crowding is a ubiquitous phenomenon in many services industries with major negative consumption consequences (Eroglu, Machleit, and Barr 2005; Harrell, Hutt, and Anderson 1980; Hui and Bateson 1991). To cope with some of the problems, such as long waiting time, arising from crowding, self-service technologies (SSTs) are increasingly adopted by firms because they are supposed to help firms improve service productivity and help customers reduce the inconvenience and waiting time caused by crowding (e.g., Dahbholkar, Bobbitt, and Lee 2003; Gelderman, Paul, and Diemen 2011; Wang, Harris, and Patterson 2012; Weijters et al. 2007). To encourage more customers, particularly those who prefer to interact with service employees, to use SSTs, service organizations start to imbue anthropomorphic features in the design of SSTs. Both anecdotal and academic evidences suggest that anthropomorphism design makes brands or products more likeable and enjoyable (Aggarwal and McGill 2007; Delbaere, McQuarrie, and Phillips 2011). However, existing research has yet directly examined whether anthropomorphizing SSTs, particularly in a crowded environment, is effective.

We argue that the impact of anthropomorphic design in SSTs on consumer response in a crowded situation depends on consumers’ attributions of the crowding. Crowding by definition is a bi-dimensional construct with its attribution to either social or spatial causes - a bi-dimensional construct with its attribution to either social or spatial causes (Baum and Koman 1976; Baum and Valins 1979). Social crowding refers to the case when the crowding is mainly attributed to the large number of people whereas spatial crowding is mainly attributed to the inadequacy of physical space. We predict that customers are less likely to prefer anthropomorphized SSTs when they attribute the crowded environment to social reasons rather than spatial reasons due to a social withdrawal tendency. We test the hypotheses with one pilot study and four experimental studies using both student and nonstudent samples from Hong Kong and the United States.

The pilot study provides preliminarily support to our prediction that crowding attribution × anthropomorphism interaction was significant (F (1,193) = 3.10, p < .05) on social withdrawal. Specifically, participants in the social crowding condition experience more social withdrawal when the SST was high (vs. low) (Mhigh anthropomorphism = 6.50, Mlow anthropomorphism = 5.36; t (1, 193) = 1.98, p < .05) in anthropomorphism. Furthermore, in the high anthropomorphism condition, participants in the social crowding condition (Msocial crowding = 6.50) reported a higher social withdrawal than those in the spatial (Mspatial crowding = 5.46; t (1,193) = 1.79, p = .08) and low crowding conditions (Mlow crowding = 5.05; t (1,193) = 2.61, p < .01).

Study 1 examines the interaction effect of crowding attribution and SSTs anthropomorphism on customers’ behavioral intentions to use the machines (F (1, 214) = 18.44, p < .001). We show that when customers attribute the crowding environment at the canteen to social reasons, their intentions to use the anthropomorphized (vs. non-anthropomorphized) self-ordering machine were lower (Msocial crowding = 6.77; t (1,214) = 1.70, p = .09). When customers attribute the crowding to spatial reasons, they actually indicate higher intentions to use the anthropomorphized (vs. non-anthropomorphized) machine (Msocial crowding = 7.31; Mlow anthropomorphism = 6.47; t (1, 214) = 1.76, p = .08). In the low crowding condition, intentions do not differ across the anthropomorphism conditions. Furthermore, in the high anthropomorphism condition, participants in the social crowding condition (Msocial crowding = 5.96) report lower (higher) intentions to use the machine when they were in the spatial (low) crowding condition (Mspatial crowding = 7.31; t (1,214) = 2.82, p < .01; Mlow anthropomorphism = 4.62, t (1,214) = 2.86, p < .01). In the low crowding condition, there is no significant difference between the social and spatial crowding conditions but intentions in these two conditions are higher than that in the low crowding condition.

Study 2 extends Study 1 by examining the interaction effect of crowding attribution and SSTs anthropomorphism on customers’ attitudinal response (F (1,140) = 3.90, p = .05). Again, Study 2 shows that anthropomorphizing the SST backfires if the crowding environment is attributed to social reasons (Msocial crowding = 6.02; Mlow anthropomorphism = 6.73; t (1,140) = 1.826, p = .07), but this does not matter when the crowding environment is attributed to spatial reasons (Msocial crowding = 6.02; Mspatial crowding = 6.67; t (1,140) = 1.72, p = .09). In the low anthropomorphism condition, however, attitudes did not differ between the social and spatial crowding conditions.

Study 3 extends the interaction effect to customers’ choices between ATM and bank tellers (F (1,145) = 3.87, p = .05) as well as perceived service quality of the bank (F (1,145) = 6.17, p < .05). Simple contrast results are consistent with Study 2. Furthermore, by ascertaining the mediated moderation process, we confirm that the interaction effects of crowding attribution and anthropomorphism on customers’ choice of ATM over bank tellers (index = .20; CI: .01 to .43) and perceived service quality (index = -.07; CI: -.23 to -.00) are accounted by their social withdrawal tendency.

Study 4 is a field experiment in collaborating with a student canteen with natural customer density and real anthropomorphism design of self-ordering machines and we measure customers’ real choice of machines (F (1, 66) = 5.17, p < .05). With the actual transactional data from the canteen, we confirm that anthropomorphism design reduces customers’ adoption of machines during the rush hours (social crowding) (Msocial crowding = 6.82; Mlow anthropomorphism = 6.34; t (1, 66) = 4.73, p < .001). However, whether the machines are anthropomorphized or not does matter during non-rush hours (low crowding).

Contrary to the prevailing beliefs on the beneficial effects of adopting SSTs, this research shows that customers in a crowded environment do not always prefer SSTs over human staffs and anthropomorphizing SSTs can backfire especially in social crowding environment. The findings provide significant implications on
crowding management, and the employment and anthropomorphism design of SSTs for service managers.

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