



The impact of anthropomorphism on customer satisfaction in chatbot commerce: an experimental study in the food sector

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Abstract

Food retailers are lagging behind other industries in implementing innovative mobile solutions offering their services and purchasing processes on their online platforms. Chatbots can be leveraged as an application to provide customer-centric services while retailers benefit from collecting consumer data. Previous literature on chatbot technology provides evidence that human characteristics enhance the customer experience. This is the first experimental study to investigate consumer attitudes and satisfaction with anthropomorphic chatbots in food e-commerce. A sample of 401 participants was tested to verify the proposed hypotheses. The test group interacted with a standard chatbot without human-like characteristics, while the control group communicated with the anthropomorphically designed agent. The results confirm the vast potential of anthropomorphic cues in chatbot applications and show that they are positively associated with customer satisfaction and mediated by the variables enjoyment, attitude, and trust. The findings suggest that to remain competitive, food retailers should immediately adopt innovative technologies for their omnichannel strategy and incorporate anthropomorphic design cues.

Keywords Consumer behavior · Conversational commerce · e-commerce · Chatbot · Anthropomorphism · Customer experience · Customer satisfaction

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1 Introduction

More than ever, companies are forced to rethink how they interact with consumers and differentiate themselves by delivering better customer experiences [49]. Chatbots are a way to communicate with consumers and to push services as well as sales processes. With the goal of increasing purchases businesses are deploying conversational interfaces on their platforms to enhance the online shopping customer experience and satisfy customers' needs [74]. According to a study by Aspect Consumer Experience Index [6], more than half of consumers stated interacting with a chatbot application at least once a week and consumer interactions with conversational agents will continue to rise. The emergence of chatbot commerce represents the next big opportunity for brands and retailers and market expected to grow in size from \$2.9 billion in 2020 to \$10.5 billion by 2026, at a CAGR of 23.5% until 2026 [51]. For the development described, three underlying, interconnected drivers must be identified. First, the rapid evolution of artificial intelligence use-cases in recent years. Second, the rapid mass-adoption of chatbots within corporations, especially in the customer service segment. And third, the growing adoption of chatbot usage in our societies, which is especially connected to the potential of millennials. Within this generation of tech-savvy and often early adopting consumers, 56% stated their willingness to buy products via chatbots, and 25% had already shopped for goods through a chatbot in 2018 [34]. These figures suggest a disruptive transformation of the interaction experience between consumers and retailers by the integration of conversational technologies.

Over the past two decades e-commerce has changed shopping behavior and transformed the retail landscape from brick-and-mortar to omnichannel [8]. Recently, the number of online grocery orders has increased significantly, boosted in no small part by the Covid-19 pandemic [63]. Online food shopping platforms represent a large market in a nearly perfect competitive scenario, which offers new opportunities for entrepreneurs as well as established retailers [78]. In this context, the importance for retailers to keep up with the latest technologies and implement digital agents in their online sales process is emphasized. In food retail in particular, many businesses are not yet fully prepared for this evolution. Begley et al. [8] state that technological advancement has finally reached food retail and grocers worldwide need to seek solutions to support the digital customer journey [8]. This paper addresses the digital transformation that food retailers are facing and demonstrates the potential of mobile applications as a sales channel.

Nevertheless, consumers might experience discomfort when they are not convinced of communicating with a human [50]. Research has shown that consumers generally prefer to interact with actual humans rather than chatbots. For this reason, addressing consumer skepticism toward digital agents is crucial for retailers [65]. However, research also indicates that consumer experiences can be improved by chatbots that are able to imitate human dialogues [34]. Rhim et al. [63] demonstrate that chatbot users' perceptions can easily be influenced by applying anthropomorphic traits to the application. Anthropomorphism in IT describes the process of endowing non-human technologies with human features [24].

To date, there has been little empirical research on consumers' experiences with anthropomorphically designed chatbots in food e-commerce, perpetuating uncertainty about their impact on consumer satisfaction and attitudinal behavior. Our paper addresses this research opportunity using a scenario-based experiment. The first scenario features an anthropomorphic chatbot with human-like conversational and visual design features, and the second uses a basic application on an identical fictional e-commerce website. In this context, we investigated the impact on consumers' satisfaction, enjoyment, attitude, and trust when interacting with the respective chat agents. Moreover, as there is only limited information available on anthropomorphic chatbots for commercial purposes, we focus on digital agents as a sales and marketing channel rather than a customer service solution. This study further differs from earlier papers as we performed a practical experiment, whereas other authors have measured effects basically by displaying illustrations [17]. Sheehan et al. [71] confirmed that the validity of results can be improved by asking participants to experimentally engage with and subsequently rate a conversational agent. Confirming the relevance of our paper, research shows that anthropomorphism will become increasingly important in the development of chat agents as natural language systems attempt to replicate interpersonal services [71]. The stated objectives are addressed by the following research question that reflects the intent of the present study:

How does the interaction with anthropomorphic chatbots affect consumer attitudes and satisfaction on an e-commerce platform?

After an introduction to chatbot commerce as well as the concept of human-computer interaction (HCI), the prominent SEEK model by Epley et al. [24] is explained as the underlying theory on anthropomorphism. Scientific insights into anthropomorphically designed interfaces, specifically human-like cues in chatbot applications, and their impact on consumer perceptions are given. This is followed by the hypotheses development and data analysis. The results are interpreted using t-test and ANOVA as well as correlation and mediation analysis. The discussion section advances our knowledge about the strategic use of human-like design cues in chatbot commerce and gives managerial implications for the appropriate introduction of chatbots in food retailing.

2 Literature review

The following section discusses chatbot technology in e-commerce, theories on online customer experience, and describes the term customer satisfaction in more detail. Subsequently, anthropomorphism and its position in HCI, and finally findings on anthropomorphic chatbot design are examined. We refer mainly to sources from the field of consumer research, scientific psychology, marketing, and information systems, as well as human-technology interaction and communication.

2.1 Chatbot commerce

Chatbot commerce (hereinafter also referred to as conversational commerce) describes the use of natural language technologies on several platforms for commercial purposes. In chatbot commerce consumers can communicate and purchase products directly through a human-like mobile messenger platform [34]. Conversational agents can be programmed with the objective of identifying consumer needs and refining offers based on choices and preferences. They facilitate sales, ordering, and delivery processes for the business and the consumer [27]. Han [34] mentions chatbot commerce as a widely used tool in online food ordering. Taco Bell and Domino's Pizza, for example, provide a simple text-based order process via messenger. The central and primary purpose is to push online shop visitors to not just communicate with the business but to ultimately convert them into a customer [61].

“Chatbot” is a hypernym for a conversational interface such as a virtual or digital agent, chatterbot, and conversational agent. The software responds to inputs in natural language and attempts to interact with humans in a voice-based (e.g., Microsoft Cortana) or text-based manner. Conversational agents are among the primary technologies in language based HCI science. HCI focuses on interaction design and is known for its influence of the connection and communication between machines and human beings [45]. Initially, the development of the visual user interfaces was considered the major objective of early studies conducted in HCI [29]. Today's development of artificial intelligence (AI) and the accessibility of messenger technologies have changed the way humans interact with devices, from traditional swipe-and-scroll interfaces to natural language communication [26].

AI bots are well suited for companies that need to analyze large amounts of data while learning from the data itself [41]. However, some chatbots are programmed to use simplex techniques for pattern matching and processing strings to engage with consumers, namely rule-based and generative models [38]. Unlike AI-based chatbots, rule-based chatbots are not collecting data over years in order to analyze algorithms to understand the consumer. The implementation of the chatbot technology has not yet peaked, as the number of businesses adopting it continues to increase [3]. In fact, the importance of chatbots is growing as our computer technologies continue to evolve and consumer behavior is changing as a result. In the meantime, particularly online users have become accustomed to interacting with their counterparts constantly and quickly whenever they want. Digital agents are often used as an additional option to a regular customer service and provide customers with information for various inquiries, whereby their top priority is always to deliver immediate and comfortable solutions [29].

In contrast to the brick-and-mortar store, the transmission of digital customer data can categorize visit types that differ in terms of likelihood to purchase. The digital environment is an opportunity to identify shopper motivations and analyze responses to promotional activities. The ability to collect consumer data enables e-commerce marketers to target likely shoppers and design more effective, tailored marketing measures [55]. Chatbots are about to replace sales assistants with real-time and synchronized two-way interactions, helping companies build relationships with users in the online environment [82].

Online customer experience can be considered a major subject for e-retailers in the shopping environment, as the number of touchpoints between customer and company has increased significantly. The complexity of the customer journey and the number of actions to be tracked in a buying process has risen due to intensified fragmentation of channels [47]. Online customer experience can be described as an individual, multidimensional, psychological reaction to an online platform. Customers perform cognitive and affective conditioning on incoming sensory information from a series of text-based and visual stimuli on a website, all of which then create an impression in the human's brain [10]. According to Bleier et al. [10], informativeness is the most important cognitive element of online customer experience. Informativeness measures the operational component, as well as the consumer experience level and the extent of comprehensible information on a website [10, 48].

To improve the customer experience, Bleier et al. [10] also mention the importance of entertainment, which is a commitment to the website experience that not only provides a performance-based purchase opportunity but also includes fun and play [16, 52]. Online marketers should also consider some level of social presence on their channels, as it can transmit feelings of interpersonal connection through the content [11, 31]. Consumers might observe human presence and build an emotional connection to a product on a website [20]. This process is the basis for higher levels of perceived enjoyment, loyalty, and purchase intentions [19, 77]. Although the online environment may reduce sensory experiences, the recipient's senses can be stimulated by visually appealing cues in the technology, e.g., images [22, 69].

Affecting consumers through sensory stimuli has a positive impact on perceived product performance [81] and purchasing behavior [68]. Chat agents have the power to influence the customer experience with the retail channel if the dimensions of sensory stimulation, informativeness, and entertainment are implemented. Building on these factors, chatbot technologies can provide an additional communication channel that can also serve as an advertising medium for the retailer. In this respect, the experience with the agent directly influences the user's perception of the product and brand [65]. However, retailers need to be aware that customer experiences occasionally do not depend only on the design of the chatbot application. External factors that cannot directly be influenced, such as the emotional stages of consumers, also contribute to the online customer experience [18].

Online customer satisfaction is the result of successful online customer experience and serves as the key to a company's success and competitiveness [39, 55]). According to Oliver [59], customer satisfaction is defined as the extent to which a service or product satisfies the consumer in a pleasant way. Thus, customer satisfaction is closely related to customers' affective reactions to the service. Following Oliver's [59] view, this study understands satisfaction as both a post-consumption evaluation and the overall perceived satisfaction following the interaction with the chat agent on the e-commerce website.

Chatbots often have a search or decision support function to create a more convenient, unique, and interactive purchase process. Employed by businesses, they leverage customer satisfaction, build essential relationships, and reduce uncertainty and anxiety. Moreover, they provide consumers with a more comprehensive range of items and service offerings and improve retailer efficiency [15]. Due to their

conversation-driven, data-based, and forward-thinking character, chatbots play an important role in fostering customer loyalty [66]. Their main functions are information provision support, navigation assistance for targeted product search, and recommendation provision [2]. Customers can make use of their advantages and receive precise information, obtain guidance, and find out about the latest trends in a time-saving manner [17]. For instance, the chatbot can detect the availability of a particular product and provide information or suggestions about a potential purchase (cross-selling/up-selling). Developers of chatbot applications should pay attention to the accuracy of given recommendations in order to address the customer needs. The technology also must be designed to be convenient, adaptable, and offer a level of process efficiency that enhances the customer experience and therefore contributes to customer satisfaction [44].

Studies of new technologies have found consumer attitude to be a valuable outcome variable after interacting with a conversational agent [36]. Also, the influence of technological devices on enjoyment has been evaluated several times. However, hedonic aspects (e.g., enjoyment) have been revealed to be more important than instrumental properties (e.g., practicability) in e-commerce [16]. Intensified intrinsic pleasure or joy are factors that generate positive customer attitudes toward online shopping [42]. Research indicates that perceived enjoyment is associated with attitudes in the e-commerce environment [16]. Araujo [5] mentioned that human-like chatbots might affect consumers' attitudes, satisfaction and sensitive attachment to the business and its online appearance. Humanized agents can boost online purchases by eliciting higher levels of empathy and expertise compared to chatbots, which lack human-like cues [50]. Overall, customer experience is affirmatively related to customer satisfaction in e-commerce. Thus, customer satisfaction in chatbot commerce can be achieved if the dimensions of customer experience are properly integrated into the technology [75].

Nevertheless, Sheehan et al. [71] stated that the discrepancy between expectations and experience is a major cause of customer dissatisfaction. Users of highly human-like digital agents expect them to have human cognition. This may result in consumers first overestimating the capabilities of these technologies and then being disappointed when the reality does not match their expectations [71].

2.2 Anthropomorphism

Anthropomorphism refers to the tendency to deploy human attributes, physic characteristics, feelings, and traits onto a nonhuman object. Primarily, the projection of human characteristics onto digital agents serves to understand and explain their behavior. Notably, people with limited time or cognitive resources have been discovered to be prone to make judgments that are influenced by pre-existing anthropomorphic background knowledge [24]. The central concept underlying our paper is the anthropomorphism theory, which has until now received limited attention in HCI research. Epley et al.'s [24] "SEEK" (Sociality, Effectance, Elicited Knowledge) model helps to explain the practice of anthropomorphism by centralizing factors of the likelihood that a person will use anthropomorphism. First, elicited agent

knowledge represents the cognitive determinant of anthropomorphism, judging an unfamiliar non-human object. If an object appears to be similar to oneself or to a known other, the perceiver is more likely to activate available information to evaluate that object [24, 79]. Therefore, elicited agent knowledge is strongly influenced by anthropomorphic features [80]. More specifically, the closer that the perceptual object approximates a human regarding observed characteristics and behavior, the more likely it is that people will anthropomorphize [24].

Second, sociality motivation refers to a person's desire to be in social relationships with others. In situations that stimulate the desire for social connection or spawn feelings of loneliness, people tend to anthropomorphize intensively. Lastly, effectance motivation refers to a humans' fundamental desire to comprehend and maintain command of the surroundings [11]. Technology users often are unaware of a new non-human automation but need to rely on the chatbot to perform a particular task. Adding anthropomorphic attributes to the digital agent can help to reduce uncertainties while creating a feeling of familiarity [23, 25]. In contrast to the underlying cognitive factor, such motivational determinants can best be understood as driving conditions that are induced by a lack of social bond (sociality motivation) or control (efficacy motivation). However, the motivational and cognitive anthropomorphic effects appear to be unrelated, being based on separate psychological pathways [24]. In summary, the degree to which someone anthropomorphizes a non-human agent relies on the three determinants described above. These factors are capable of projecting anthropomorphic knowledge onto a particular object during an inductive argumentation process.

Anthropomorphism has been found to influence consumer behavior, as people tend to feel more engaged and connected to the anthropomorphic object; trust increases steadily with the degree of anthropomorphism. Some product marketers have already discovered anthropomorphism and are adding human attributes to their goods and services to make them more likable [1]. Findings on the impact of anthropomorphism on behavioral intentions can also be confirmed when applied to conversational technologies.

Anthropomorphic design is particularly important in HCI as it aims to affect the perceiver in a positive way by humanizing the technology. Nass et al. [56] were among the first to find that people facilitate their interactions with machines by using social heuristics interspersed with human cues. Melo et al. [53] showed that during interactions with computers, people search for humanity and tend to attribute anthropomorphic traits to them. This results in socially accurate behavior toward the machines, as well as positive and emotionally charged reactions toward the technological objects. Sheehan et al. [71] found that anthropomorphic chatbots are generally more likely to be employed as they imitate human agents and therefore convey a feeling of being easier to use. The greater the need for human interaction, the greater the likelihood of adoption. An anthropomorphic chatbot is a digital agent that is attributed human-like characteristics, while anthropomorphic design cues are human-like verbal and nonverbal cues that can be added to a chatbot to evoke human qualities [18]. In HCI, anthropomorphism is triggered by human-like stimuli. IT programmers use human-like cues in order to make users feel familiar with the technology, even if there is no natural or personal connection. An anthropomorphic

software design evokes human qualities, which encourages people to bond with the object more quickly, thereby fostering perceived trustworthiness [13, 24].

There are several approaches in the literature regarding how digital agents can be anthropomorphized. In this study we focus on the approach of Go and Sundar [32], who propose visual cues, identity cues, and conversational cues as humanization tools for chatbots. Human-like visual cues are nonverbal implementations that can shape social perceptions through attributes like gestures, pictures, or emoticons. Emoticons are among the nonverbal symbols transmitting emotive impressions in any textual and technology-based interaction [21]. Research on HCI has demonstrated that emoticons contribute to triggering people's social and emotional reactions [12, 78]. Also, embedded social identifiers can easily enhance the agents' perceived human-like qualities. Components such as demographic information or images lead chatbot users to assess their level of performance depending on their expectations of human agent characteristics [32]. Araujo [5] attributed the agent in his experiment with a name by which to be addressed and added human-like conversational cues, which resulted in a stronger anthropomorphism perception for observers than with the non-anthropomorphic version of the object. Conversational cues include word or phrase choice and the way in which a narrator describes himself or herself and others [40]. Conversational cues are able to add anthropomorphism through emotional expression. Studies confirm that varied and context-sensitive responses increase the human-like nature of an agent's verbal behavior [43, 70].

Anthropomorphism in chatbot design conveys a sense of efficacy, as the agent's competence then seems magnified to the consumer [24]. According to Goetz et al. [33], gamified robots appeared to be more sociable and outgoing compared to serious ones. Consequently, people prefer interactions with gamified machines rather than with more formal ones. Another implication of anthropomorphically designed agents on consumers is the promotion of their ability to cope more easily with information overload. Lastly, anthropomorphic technologies were found to increase consumers' perceived enjoyment and trust, which in turn amplified their intention to use the technologies [62]. Social presence is a key dimension of online customer experience and is preceded by anthropomorphic design cues. As customer satisfaction is defined as a reaction to online customer experience, we expect a positive relationship to exist between the level of anthropomorphic design cues and customer satisfaction. For this reason, our first hypothesis is as follows:

H1 *There is a positive relationship between the level of anthropomorphic design cues and customer satisfaction.*

The findings suggest that anthropomorphic chatbot design may be an effective way to improve perceived enjoyment, attitude, and trust when interacting with technological agents. To develop a full understanding of the three concepts, we briefly discuss them here. **Perceived enjoyment** is part of the hedonic dimension, which has intrinsic value in online commerce and measures users' feelings. Users

who interact on a website and experience enjoyment are more likely to purchase from and return to the website repeatedly. The virtual interaction between retailer and consumer should be entertaining in order to trigger enjoyment and pleasure in the consumer. Generating enjoyment enables the retailer to establish a long-term relationship with its customers [9]. It is necessary to include perceived enjoyment as a concept, as it must be considered an essential element to enhance a positive customer experience in online environments.

Attitude is the tendency individuals have acquired to judge and evaluate a certain object or situation. This evaluation can be positive or negative and is considered to be the result of a cognitive process. Especially in online shopping, customer attitudes are important because they directly influence repurchase intentions. Previous studies report that the customer's attitude serves as the best predictor of purchase intention, particularly in food retailing [4].

Trust is one of the most important factors to be considered in realizing the potential of e-commerce. Trust can be interpreted as a feeling of conviction and forms a precursor to online customer experience. This variable evokes emotional states and develops according to the online experience of a consumer. Online channels provide little face-to-face contact, which is why uncertainties and fears are present and lead to a greater need for trust. Several references indicate that online commerce requires greater trust than offline retail [64]. Based on our findings, we propose the following hypotheses:

H2a : *There is a positive relationship between anthropomorphic design cues in a chatbot and consumers' perceived enjoyment toward the chatbot.*

H2b *There is a positive relationship between anthropomorphic design cues in a chatbot and consumers' attitude toward the chatbot.*

H2c *There is a positive relationship between anthropomorphic design cues in a chatbot and consumers' trust toward the chatbot.*

Osman and Sentosa [60] found that trust has a mediating effect on customer satisfaction. Vinerean and Opreana [59] support this finding and introduce attitude as an additional mediator for customer satisfaction, respectively in e-commerce. Perceived enjoyment is considered to be a consequence of successful entertainment. In Sect. 2.1 we noted that entertainment is a key dimension of online customer experience. Since customer experience and customer satisfaction go hand in hand, we assume that perceived enjoyment can also be considered as a mediator. Following this assumption and our findings in Sect. 2.2 we propose our final hypotheses:

H3a *The relationship between anthropomorphic design cues and customer satisfaction is mediated by perceived enjoyment.*

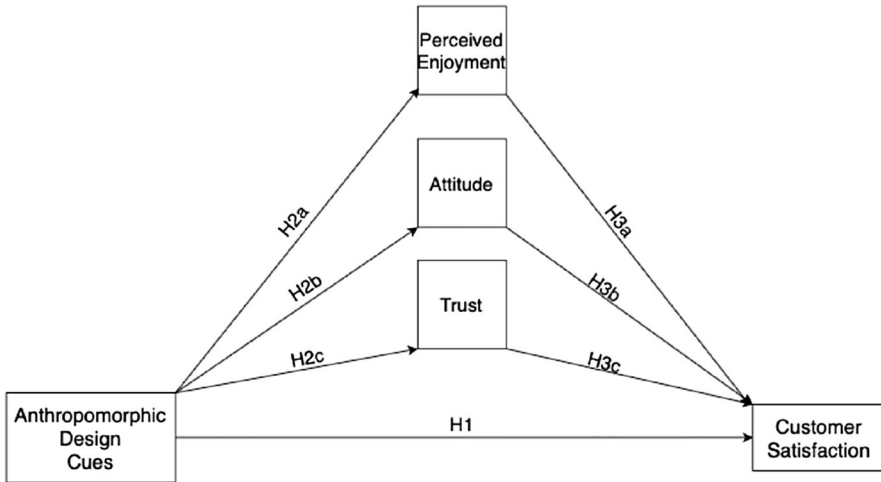


Fig. 1 Conceptual model

H3b *The relationship between anthropomorphic design cues and customer satisfaction is mediated by attitude.*

H3c *The relationship between anthropomorphic design cues and customer satisfaction is mediated by trust.*

The hypotheses' relationships with each variable are depicted in Fig. 1. In our conceptual model anthropomorphic design cues is the independent variable and customer satisfaction the dependent one, which is mediated by the three mediator variables: perceived enjoyment, attitude, and trust.

3 Method

This section briefly describes our research approach including the experimental design, data collection, and sample size. At the end of this section the derivation and application of the measurement items used in collecting the data are explained.

3.1 Research approach

We applied the deductive approach to test for relationships between variables through deducing hypotheses [67] to achieve the research goal. A lack of scientific findings on the effects of anthropomorphic chatbot technologies on a food e-commerce platform was identified in our search of the literature. The few references published to date addressing the humanization of chatbots focus mainly on those implemented in customer service-related scenarios but not on those related to commerce.

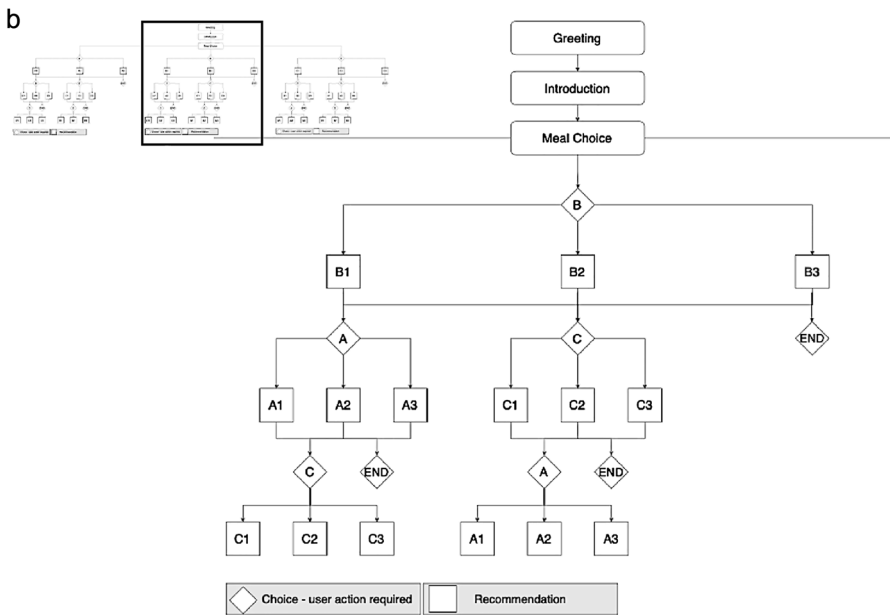
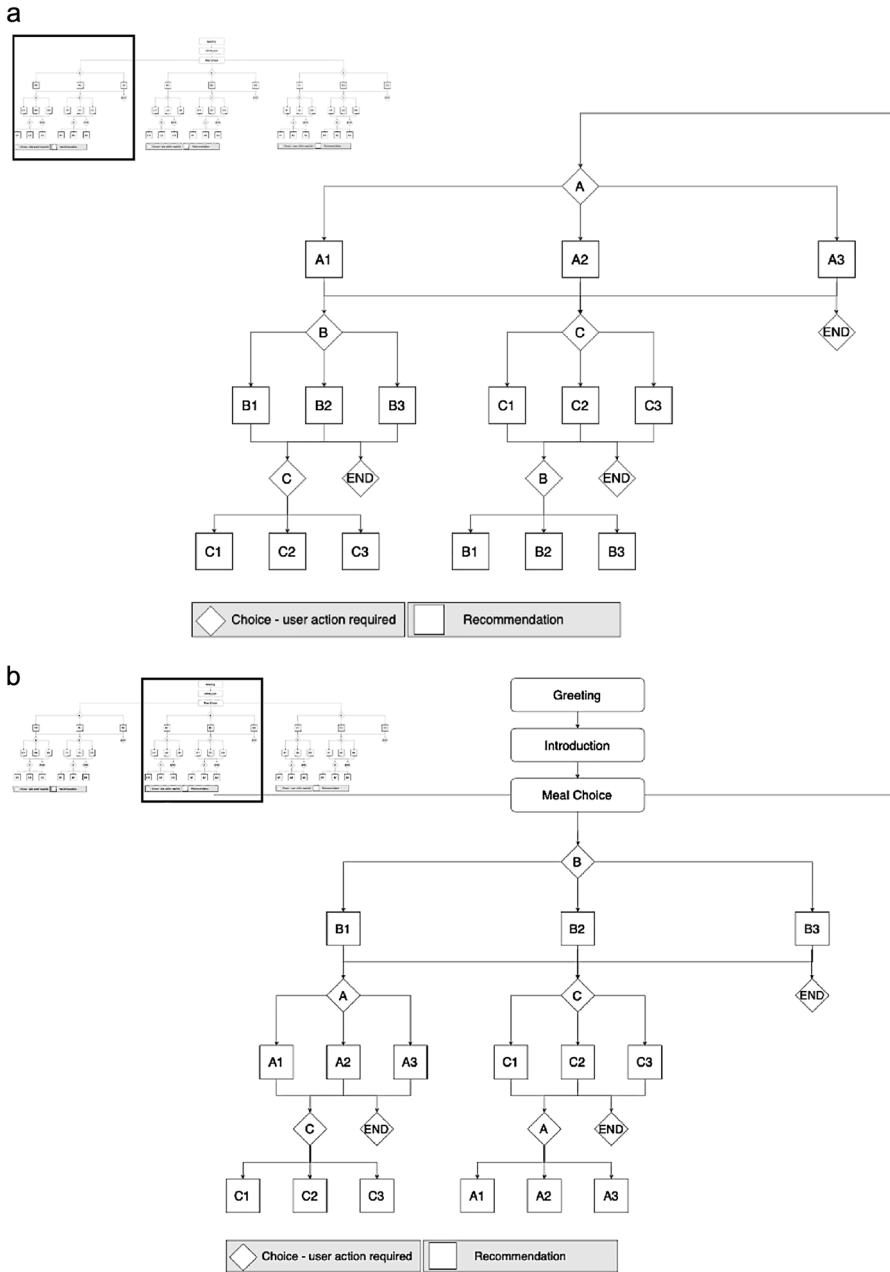


Fig. 2 a Chatbot System Design: Part A of the entire conversation path, b Chatbot System Design: Part B of the entire conversation path, c Chatbot System Design: Part C of the entire conversation path

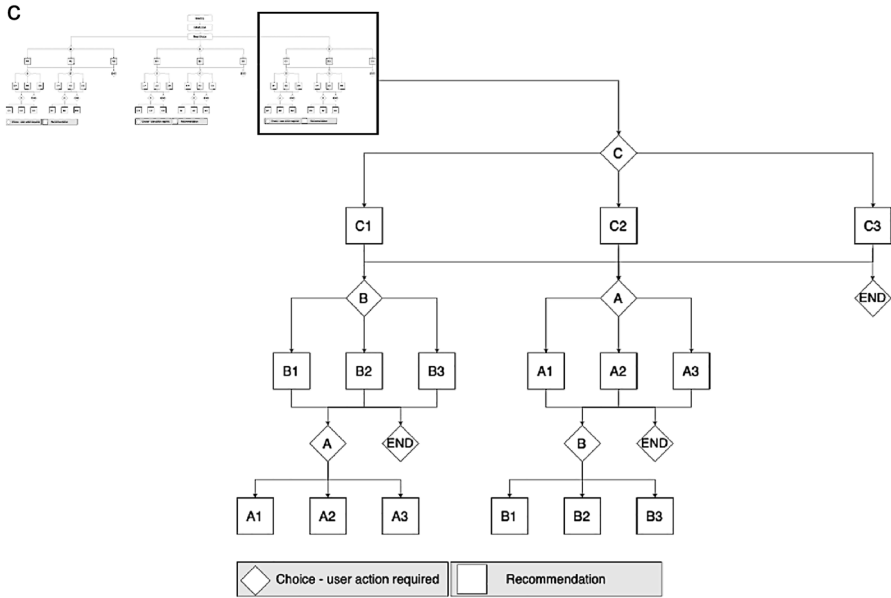










Fig. 2 (continued)

The limitation detected in our search through the literature is that data have been collected via non-experimental approaches only, with the mere description or graphical illustration of a chatbot interaction, but not the replication of a real-life scenario on an e-commerce platform [17]. For testing our hypotheses, two identical food e-commerce platforms were developed with Wix Website Builder. The e-store was specialized in retailing various types of pasta. The sites differed only in the use of chatbots, which were implemented using the Flow XO tool. Figure 2a–c illustrate the chatbot system design with its entire conversation path. Chatbot 1, hereinafter “Luigi”, was programmed with anthropomorphic features as described in Table 1, while Chatbot 2, hereinafter “standard”, did not show any of these cues, but only a rational identity and a visual and conversational design.

Figure 3a shows the introduction cues of both agents, Luigi on the left and the standard chatbot on the right. It is evident that Luigi has been programmed with many humanized cues. It begins with the visual representation, which contains a personalized icon and the implemented demographic information, which first represents his name and clarifies his origin and role through linguistic means. The incorporated social dialogues and emoticons add elements of playfulness and vividness to the conversation. The standard chatbot uses no identity or visual cues at all and has no social dialogues in its conversation cues, making the introduction very impersonal. Figure 3b shows the emotional expressions added to Luigi that include exclamations. Furthermore, the verbal style is tailored to the scenario, as he uses self-references in which he gives some recommendations. These conversational cues are not part of the standard bot, which leads to a less interactive and exciting conversation. Figure 3c depicts temporal cues, such as reminders to answer omitted

Table 1 Anthropomorphic cues in the chatbot application

Type	Anthrop. Cue	Example	"Luigi"	Reference
Identity	Visual representation	Images, avatars, faces		[61]
Identity	Demographic information	Name, gender, ethnicity	Luigi, male, Italian, chef	[61]
Visual	Emoticons	Symbols used to express emotions	      	[77]
Conversational	Social dialogue	Greeting rituals, anecdotes, non-task related questions	"Ciao, I'm Luigi!"	[17]
Conversational	Emotional expressions	Apologies, congratulations, concerns	"Mamma Mia, you'll love our fresh pasta!"	[20]
Conversational	Verbal style	Self-references ("I") variability of syntax and words	"I'll recommend the best sort of pasta."	[75]
Conversational	Temporal cues and reminders	Delayed responses to signal writing; sending reminders	"Just a reminder to answer my question."	[54]

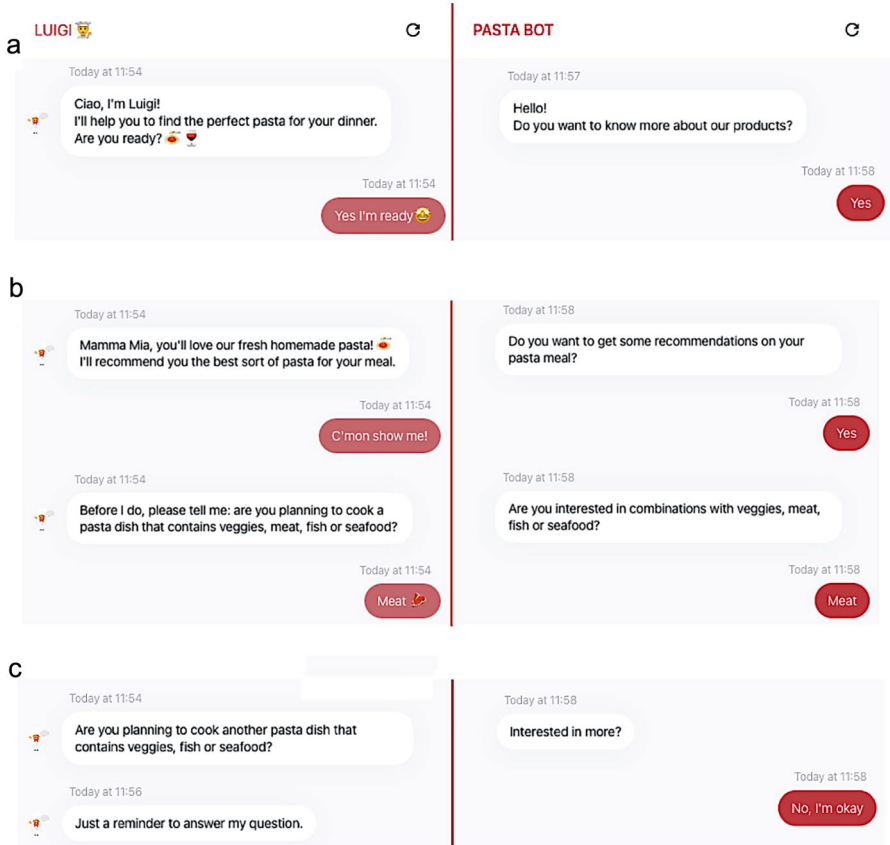


Fig. 3 a Visualization of the research object b Visualization of the research object c Visualization of the research object

questions, which are not sent in the default chatbot scenario. A more detailed extract from the chatbot conversations for both scenarios can be found in the Appendix.

3.2 Data collection and sample

Primary data collection through online channels enabled the rapid collection of a relatively large amount of data, lent itself to automation, and increased response rates. The online questionnaire was promulgated primarily through social media (Facebook, WhatsApp, and Instagram) with the employment of the non-probability sampling method with convenience and snowball sampling. In addition, the survey

Table 2 Demographic characteristics of respondents

Variable	Category	N	%
Gender	Male	194	48.4
	Female	198	49.4
	Non-binary/third gender	2	0.5
	Prefer not to say	7	1.7
Age	14–24	125	31.2
	25–40	260	64.8
	41–56	12	3.0
	57–75	4	1.0
Education	Less than high school degree	4	1.0
	High school degree or similar	82	20.4
	Bachelor's degree	168	41.9
	Master's degree / MBA or similar	144	35.9
Job Level	Doctorate degree / PhD	3	0.7
	Student	146	36.4
	Working Student	48	12.0
	Employed	193	48.1
Nationality	Unemployed	14	3.5
	German	318	79.3
	Portuguese	19	4.7
	Italian	22	5.5
	Spanish	1	0.2
	French	7	1.7
	American	7	1.7
	British	1	0.2
Dutch	2	0.5	
Other	24	5.9	

exchange network “PollPool” was used as a tool to generate more participants. On the platform, survey creators can answer surveys and in return receive responses to their own questionnaires. All participants answered the form on a voluntary basis and without financial reward. The survey was designed with Qualtrics and was active between 11 July 2021, and 1 August 2021. Respondents were required to answer five demographic questions designed to confirm sampling criteria. One question about online shopping frequencies, and one about previous chatbot experiences, while 34 questions were asked related to the actual chatbot interaction in the experiment. The survey randomly assigned the two different scenarios to the participants. The respondent was asked to follow a link to the website where either Luigi or the standard chatbot was available. Arriving on the page, the user had to chat with the respective bot and then return to the survey.

A total of 401 respondents participated in our study; a balanced distribution was obtained of 200 respondents exposed to Luigi and 201 people exposed to the

Table 3 Online shopping habits

Variable	Category	N	%
Previous Chatbot Interaction	Yes	341	85.0
	No	31	7.7
	I don't know	29	7.2
Shopping Frequency	1–3 times a year	11	2.7
	4–6 times a year	62	15.5
	7–12 times a year	114	28.4
	1 + per month	142	35.4
	1–2 times per week	64	16.0
	3 + per week	2	0.5
	never	6	1.5

standard bot.¹ A balance between genders (194 males and 198 females) was also attained. Additionally, a third/neutral-gender ($n=2$) and an optional choice ($n=7$) were given. The age structure of the respondents was divided into the four main popular generations; Gen Z, Y, X and baby boomers [30]. We did not expect participants from another age category than these and in fact 65% of the respondents were between 25 and 40 years old ($n=260$), 31% indicated the age category 14 to 24 ($n=125$), while the remaining 4% were older than 40 years ($n=16$). Most of the participants were higher-education students of German nationality, but nationalities from other European countries, the USA, Africa, India, and Australia were also recorded. The details of the demographics are in Table 2. To get a better picture of their skills in using the online shopping environment, respondents also provided information about shopping frequencies and indicated whether they had any prior contact with chatbots (Table 3). The most important information we can extract from these data is that 85% of respondents were aware of having had contact with a chatbot in the past, and most of the respondents usually made online purchases more than once per month (35%).

3.3 Measurement

After collecting the demographic data and insights on online shopping habits in the first part of the survey, five constructs were measured following the interaction with the chat agent. The first one to be assessed was *anthropomorphic design cues (ADC)* using nine items that measured social presence and anthropomorphism, as discussed by Go and Sundar [32], Nowak and Rauh [58], and Goetz et al. [33]. When

¹ In total, about 10% of the respondents were retrieved from PollPool; $n=19$ for Luigi ($n=14$ male; $n=5$ female) and $n=21$ for the standard bot ($n=10$ male; $n=11$ female). No significant differences were found between the sample obtained through the survey exchange platform and the sample collected through the snowballing method. The target group allowed to participate via PollPool was defined beforehand, coinciding with the sample group from the snowball sampling.

the context required it, a content adjustment was made to change the wording from “avatar” or “human” to “chatbot”. *Customer satisfaction (CS)* could be captured using Chung et al.’s [17] approach. Their scales were appropriate for this study because they refer to a similar scenario in their research. *Customer satisfaction (CS)* was measured, e.g., whether expectations are met or if the chatbot did a good job. We were able to assess respondents’ *perceived enjoyment (PE)* of the chatbot using items developed by Mikalef et al. [54] testing for hedonic motivation. In their manual for assessing *trust or trustworthiness (TW)*, Zarantonello and Pauwels-Delassus [82] suggest dividing the scale dimensions into competence and benevolence. In addition, trust can also be used to measure the relationship with a project or a brand, and we have taken items from all three dimensions and adapted them to chatbots. Venkatesh et al. [76] describe items related to the user acceptance and *attitude (AT)* toward IT. We were able to adopt three of them to our measurement model, as the chatbot is defined as a technology. Spears and Singh [72] published a paper on conceivable variables on attitude out of which we applied two more applicable scales. The more scale points, the more refined the information content in the respective items. The 7-point Likert scale is applied to assess the preferences of the survey participants in our study. In contrast to an even number of scale points, the respondent could choose a neutral position for an odd number of response alternatives and did not have to decide on an inclination [46]. The overview of the questionnaire items in our Appendix shows the variables, their definition, and the respective measurement items based on the designated literature.

4 Results

The data were analyzed using SPSS software version 27. Single missing values could be replaced using single imputation in the data analysis software. Both descriptive and inferential statistics were applied to exemplify the sample. First, the conceptual model was tested for validity and reliability by performing confirmatory factor analysis and calculating Cronbach’s alpha coefficient. *T*-test statistics provide information about the influence of anthropomorphic chatbot commerce on customer satisfaction. The correlation analysis determines the effect size of variable relationships. Last, regressions were calculated using Hayes’ [37] mediator model to measure the effects between the variables anthropomorphic design cues (ADC), perceived enjoyment (PE), attitude (AT), trust (TW), and customer satisfaction (CS).

4.1 Validity and reliability testing

Outliers were detected with the help of boxplots and were eliminated, resulting in a normal distribution of the dataset with its scales in the range of an Asymp. sig. (2-tailed) $p > 0.05$ measured by the Kolmogorov–Smirnov test. In order to test for data fit and validity of our measurement model, a confirmatory factor analysis was performed. Both Bartlett’s measure and the Kaiser–Meyer–Olkin (KMO) test of Sampling Adequacy determine if the variables are suitable for factor analysis. Evidence for this is a chi-square range in Bartlett’s test between a minimum of 10 for CS and a maximum of

Table 4 Results of the confirmatory factor analysis

Variable	KMO	Bartlett's Test	Result
ADC	.959	Approx. Chi-Square	5342.970
		df	36
		Sig	.000
CS	.954	Approx. Chi-Square	4964.569
		df	28
		Sig	.000
PE	.936	Approx. Chi-Square	3706.848
		df	15
		Sig	.000
AT	.901	Approx. Chi-Square	3733.580
		df	15
		Sig	.000
TW	.892	Approx. Chi-Square	2751.667
		df	10
		Sig	.000

Table 5 Results of the reliability measurement

Chatbot	Scales	Cronbach's Alpha	Number of Items
Luigi	ADC	.884	9
	CS	.887	8
	PE	.887	6
	AT	.926	5
	TW	.910	6
Standard	ADC	.893	9
	CS	.850	8
	PE	.863	6
	AT	.870	5
	TW	.870	6

36 for ADC, as well as $p < 0.001$. The KMO value with a minimum of 0.892 is substantially above the recommended value [28], which means that a principal component analysis can be performed; the exact values are reported in Table 4.

The consolidation of research items belonging to one variable that originated from two different literature sources (the case with ADC and AT) turned out to be reasonable due to the positive results of the factor analysis. Afterwards, we conducted the output validity test using Pearson Product Moment Correlations to determine the validity of the questionnaire. Every item could be verified to be valid as we obtained a Sig. (2-tailed) of $p < 0.001$. In the next step, we used Cronbach's alpha as our measurement for expressing the internal consistency of the data collection instrument. The results indicate a total reliability coefficient of 0.992 for all 34 items. They range between 0.850 and 0.926 for the single items, which reveals high reliability to predict

Table 6 Independent samples t-test results

Variable	Chatbot	N	M	SD	SEM
ADC	Luigi	200	5.53	1.037	.073
	Standard	201	2.83	1.136	.080
CS	Luigi	200	5.65	.901	.064
	Standard	201	2.95	1.238	.087
PE	Luigi	200	5.42	1.092	.076
	Standard	201	2.69	1.149	.081
AT	Luigi	200	5.79	.799	.056
	Standard	201	2.80	1.272	.090
TW	Luigi	200	5.44	1.178	.083
	Standard	201	3.02	1.401	.099

Table 7 Correlation table

	Variable	N	M	SD	1	2	3	4	5
1	Age	401	1.74	.56					
2	ADC	401	4.04	1.73	-.065				
3	PE	401	4.05	1.77	-.093	.881**			
4	TW	401	4.23	1.77	-.092	.802**	.834**		
5	AT	401	4.29	1.83	-.043	.825**	.863**	.794**	
6	CS	401	4.30	1.73	-.074	.876**	.897**	.866**	.870**

** $p < .01$; * $p < .05$

the variable [35]. Table 5 reports the reliability measurement for every scale to each chatbot.

4.2 Group comparison

T-test and ANOVA were applied to investigate the group differences (gender; generation; chatbot type). Considering Levene's test, we conclude that the descriptively studied means are not statistically significant and we must neglect the gender differences for each variable. Regarding age, Levene's tested $p > 0.05$ for the variables ADC, PE, and TW, which means that age influences only those variables, while CS and AT are unaffected. The independent samples t-test was especially helpful to validate that both chatbots are perceived by the respondents to be significantly different.

In terms of ADC, we found higher perceived levels of anthropomorphism interacting with Luigi ($M = 5.53$; 7-point Likert scale) than with the standard bot

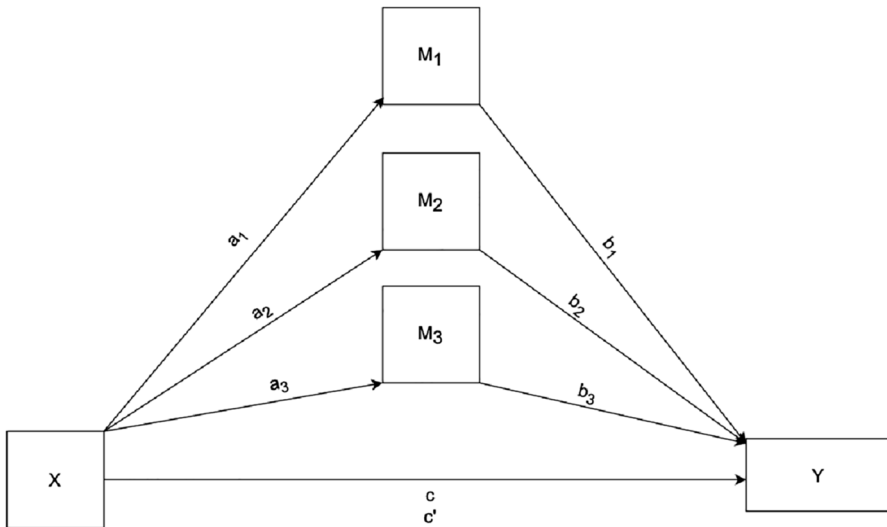


Fig. 4 Applied mediation model

($M=2.83$; 7-point Likert scale), $t(396.068)=24.768$, $p<0.05$. Our expectation (and a main precondition) is therefore confirmed that the participants perceive the anthropomorphic chatbot to be exactly what it is. Further, all scores for the standard chatbot are considerably lower than for Luigi. Table 6 reports the means of the two chatbot types, which were compared using t-test statistics at a confidence level of 0.95.

4.3 Correlation analysis

A Pearson correlation analysis was performed to measure the effect size between the variables as well as to determine the validity of H1, H2a, H2b, and H2c. The first hypothesis suggests that the level of ADC and CS is positively related; H2 expects the level of ADC to positively influence PE, AT, and TW. Coefficients $r>0.5$ indicate a high correlation.

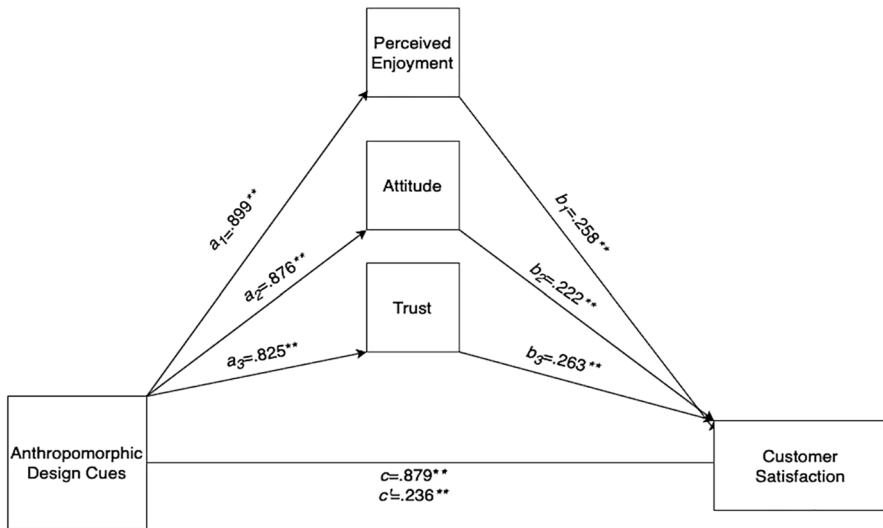
The analysis confirms a significant and positive relationship of the variables ADC and CS ($r=0.876$, $p<0.001$). Consequently, due to the high correlation between the variables, we can statistically support H1. Also, the relationships between ADC and perceived enjoyment ($r=0.881$, $p<0.001$), AT ($r=0.825$, $p<0.001$), and TW ($r=0.802$, $p<0.001$), show significant correlations. The exact values are in Table 7. The results also validate H2a, H2b, and H2c. Testing for multicollinearity, the VIF (Variance Inflation Factor) value of the coefficients were analyzed. Since all values lie between 1 and 10, there is no indication of multicollinearity.

Table 8 Bootstrapping results of the mediation model

Path	Coefficient b	df	t-value	p-value	LLCI ^{a)}	ULCI ^{b)}
a1 (<i>ADC</i> → <i>PE</i>)	.899	398	39.689	.000	.8546	.9436
a2 (<i>ADC</i> → <i>AT</i>)	.876	398	35.153	.000	.8268	.9248
a3 (<i>ADC</i> → <i>TW</i>)	.825	398	31.372	.000	.7733	.8767
b1 (<i>PE</i> → <i>CS</i>)	.258	395	4.577	.000	.1281	.3436
b2 (<i>AT</i> → <i>CS</i>)	.222	395	5.317	.000	.1399	.3041
b3 (<i>TW</i> → <i>CS</i>)	.263	395	5.457	.000	.1684	.3581
c (<i>ADC</i> → <i>CS</i>)	.879	398	38.492	.000	.8345	.9243

(a) LL=Lower Level; (b) UL=Upper Level; Confidence level for all CIs=95.0%; Number of bootstrap samples=5000

***p* < .001



Note: ** *p* < .001

Fig. 5 Applied mediation model with regression coefficients

4.4 Mediation analysis

The mediation analysis tested the impact of ADC (X) on the outcome variable CS (Y), adding the mediators PE, AT, and TW (M) to the model as illustrated in Fig. 4.

The analysis was completed with the PROCESS macro of Hayes [37], which processes regressions of ordinary least squares and provides unstandardized path coefficients for (in)direct and total effects. The 5000-sample bootstrapping setting along with heteroskedasticity-consistent standard errors helped calculate confidence intervals and inferential statistics [50]. Results were considered to be significant if the confidence intervals excluded zeros. As soon as the direct partial coefficient between

the independent and dependent variable decreases, when the indirect path through a mediator is established, mediation is present. According to Baron & Kenny [7], all conditions for mediation are met. First, the direct path between ADC (X) and CS (Y) was assessed without the intervention of the mediators. The direct path coefficient (c) was $b=0.879$, $p<0.001$ and then changed after the introduction of the mediators (PE, AT, TW) to $b=0.236$, $p<0.001$ (c'). The amount of the decrease of the relationship between X and Y accounted for by M is 0.643, which represents 73% of the total effect. After adding the mediators, the predictor variable (ADC) predicted the outcome variable (CS) less strongly; ADC significantly predicted the mediators (path a: $b_{PE}=0.899$; $b_{AT}=0.876$, $b_{TW}=0.825$; $p<0.001$), which in turn significantly predicted CS (path b: $b_{PE}=0.258$, $b_{AT}=0.222$, $b_{TW}=0.263$; $p<0.001$). The relationship between ADC and CS is mediated by all of the mediator variables with an indirect effect $ab=0.643$, 95%—CI [0.552, 0.727]. The three variables are considered to be partial mediators, as X significantly and directly effects Y. Based on the results we can confirm our last hypotheses H3a, H3b, and H3c. Table 8 summarizes the results; Fig. 5 depicts them on the model.

5 Discussion

Our study examined the factors that have an impact on customer attitudes and satisfaction in two different chatbot commerce scenarios—specifically, the effect of anthropomorphic chatbots on consumer behavior. The following section focuses on the main findings and explains how they relate to the initial literature review and the respective research question.

Consumer behavior is the study of why and how people consume products and services. Consumers' behavior can be broadly attributed to three main influences – the characteristics, environment, and genetics of the individual [14]. We can influence peoples' behavioral response by specific stimuli – in our study we used anthropomorphic design cues as a stimulus for effecting customer satisfaction in chatbot commerce.

Contrary to our expectations, we found that there is no significant effect of the gender variable on our model, even though a slight difference could be identified when analyzing the mean values. Men might be expected to have rated the scales higher as they might be more aware of technology and show a greater interest in chatbot applications. However, the ANOVA for the age groups found that age influences at least three variables. We suppose that the younger the interactors are, the more the chatbot might appear “common” to the people interacting with it, as they have grown up with the latest technologies. Our data about previous chatbot interaction and online shopping habits reflect the importance of engagement through such interfaces and is in line with our research about the growth opportunities on the global conversational agent market [51].

We revisited people's scales according to their online shopping behavior and previous chatbot interaction. Those who purchase online only 1–3 times per year rated scales for all variables the lowest. This result encourages us interpret that those people do not enjoy shopping online or only do so when necessary. In summary, the

development of chatbot features is most important for the engagement of sophisticated online shoppers, rather than those who rarely buy. Worth mentioning, too, is that people who had never (to their knowledge) interacted with a chat agent before perceived far fewer anthropomorphic cues than people who had previous chatbot experience. This is not entirely consistent with the SEEK theory of Epley et al. [24], according to which anthropomorphizing is more likely to occur when interacting with unknown non-human objects. Conversely, Epley et al. [24] did not demonstrate whether individuals who have already been exposed to a similar application anthropomorphize more than individuals who have not. However, the elicited agent theory, which states that an object to which human-like properties are added is more likely to be anthropomorphized, coincides with our observations since we received significantly higher values in terms of anthropomorphism for Luigi compared to the standard bot.

Based on our findings we assert that the variables perceived enjoyment, attitude, trust and customer satisfaction, will be rated higher when interacting with an anthropomorphic chatbot. Indeed, we demonstrated higher levels of those variables in the anthropomorphically designed chatbot compared to the standard bot scenario. Thus, an important premise related to our hypotheses could be validated. Our assumption that there is a positive relationship between anthropomorphic design cues and customer satisfaction (H1) is primarily based on the conclusion that anthropomorphism leads to greater perceived enjoyment, attitude, and trust (H2a, H2b, H2c). Those variables result from positive online customer experiences, and thus customer satisfaction is a logical consequence. Our statistical evidence confirms that we correctly proposed a significant relationship between anthropomorphic design cues and customer satisfaction (H1), congruently with Luo et al. [50], who predict higher customer satisfaction when communicating with humanized agents. Further, and not expected, a correlation analysis confirmed the positive relationship of anthropomorphic chatbot design with each of the three variables of perceived enjoyment, attitude, and trust (H2a, H2b, H2c). However, our mediator analysis validated likewise that these three variables are caused by anthropomorphism and ultimately reinforce greater customer satisfaction (H3a, H3b, H3c). Perceived enjoyment, attitude, and trust could be considered as significant partial mediators between anthropomorphic design cues and customer satisfaction. This implies that perceived enjoyment, attitude, and trust explain the relationship between anthropomorphic design cues and customer satisfaction. More precisely, anthropomorphism leads to higher levels of customer satisfaction when the level of perceived enjoyment, attitude, and trust is high. The mediation is partial and in fact is consistent with Baron & Kenny's [7] assumption that complete mediation is not realistic, rather partial mediations might be common in the area of the social sciences.

5.1 Theoretical implications

Following a comprehensive literature review on the incorporation of anthropomorphic chat agents in e-commerce, a research opportunity was discovered regarding a paucity of experimental studies in online food retail. The present study enriches the literature reporting experimental research on an innovative marketing application by analyzing the variables that play a central role for satisfactory chatbot communication. Most published studies focus on chatbots as a customer support channel, whereas our study investigates the effects of anthropomorphic design cues on chat agents as a marketing channel. We further addressed the suggestion of Roy and Naidoo [65], shedding light on how design discourse and conversational cues can be used to make chatbots appear human-like and thus create a positive impact on consumers' attitudinal behavior and satisfaction. We demonstrated that the construct of anthropomorphism can also be applied to chatbot technologies [13] and supplement the literature on the anthropomorphism theory associated with chatbot commerce, showing that a chatbot imbued with human-like cues can generate better online customer experience and, in turn, greater customer satisfaction [24, 35]. Our results are in line with Rhim et al. [63], who showed that adding humanization techniques to a chatbot agent directly affects the respondents' perceptions pertaining to perceived anthropomorphism.

Our study provides further knowledge about anthropomorphic visual and conversational chatbot design, and its impact on perceived humanness. The mediation analysis allowed us to identify mediators involved in the generation of customer satisfaction. We build on the theories of [59], who discovered attitude as a mediator to customer satisfaction, and Osman and Sentosa [60], who noted trust as a mediator in e-commerce. Derived from our inferences, we extended existing theories, introducing perceived enjoyment as a mediator into our model and demonstrated that this variable boosts customer satisfaction. Our paper highlights the importance of appropriate chatbot design when seeking higher levels of perceived enjoyment, attitude, and trust throughout an interaction; and that these very variables should be considered in order to satisfy customers in the context of chatbot commerce.

5.2 Practical implications

Our results can help marketers in the food retail sector with their decisions about the use and design of conversational tools on their online platforms. Not only did we show that chatbot technology is an effective way to reach customers, but also how the application needs to be designed to attract them. Specifically, this study encourages retailers to use chatbots as a sales channel [82]. Chatbots used in retail should lead to enjoyment, inspire trust, and generate a good attitude toward the application. In this way, customers can be attracted to the e-store through pleasant experiences. Food retailers aiming to create positive consumer impressions should be empathetic and build a lasting social bond and engage with conversations that include small talk, sympathetic feedback, emoticons, or images to create anthropomorphism and consequently increase customer satisfaction [11, 32]. Higher levels of customer

satisfaction usually lead to the retailers' main goal – enhanced purchase intentions [50].

5.3 Limitations and future research

Despite the valuable findings and insights gained for the field of consumer behavior, this study was limited in time and resources. Thus, some limitations should be considered when interpreting the results and conclusions. First, the scientific background of this experimental study and the short time frame led to technical limitations. It was not possible to develop a mature chatbot technology for the subject of this study, and we resorted instead to a minimum viable application – more precisely a rule-based chatbot with predefined responses. The e-commerce scenario was recognizable as an experiment and may have caused some bias among respondents. The e-store offered only a few products without providing a full checkout process, as it ended after the shopping cart was filled and did not continue to the normal checkout process. Our recommendation for future studies is to carry out experiments in a real-life scenario, on a proper e-commerce platform. An investigation in cooperation with global food retailers, such as Lidl or Aldi, would be especially valuable.

Second, this study may not be applicable to all sectors in retail or e-commerce. The experimental content and thus the e-commerce platform was limited to food products only, with the chatbot being designed correspondingly. Although we find that many marketers could gain insights from our results, our findings are limited to the food retail and online food sector. Future research might focus on anthropomorphism in chatbot applications in areas other than the consumer goods or retailing. For example, further research should be conducted in the context of financial services and healthcare, as chatbot interactions with customers in these sectors are expected to grow rapidly in the coming years [34]. However, to some extent, these sectors tend to be perceived as being more serious and thriving on human interaction.

Further, studies could address the technological progress, as it seems to be a promising approach to investigate AI developments in the future. In our study we could not integrate AI, as a longer period would have been required for the algorithm to learn. However, implementing AI in experimental studies could enrich the literature on HCI.

There were also limitations regarding our proposed conceptual model. We examined attitudinal and customer satisfaction variables as important in consumer behavior, yet marketers should also consider the whole purchase experience and purchase intentions in their strategies. Due to the minimum viable test scenario, we were not able to examine the consumers' experience with the actual purchase process. Therefore, future research could investigate the impact of anthropomorphic agents on the whole purchase experience in an enhanced or real-life scenario. Last, well-educated individuals from generations Z and Y predominated in our sample. Sampling methods other than non-probability and snowballing could be applied in future studies to gain insights on customer experiences across all age groups and education levels.

6 Conclusion

In this study we have outlined the importance of anthropomorphism in the context of chatbot commerce, which could be beneficial to both businesses and consumers. Attributing anthropomorphic design cues to chatbot applications can be a useful tool for improving communication and enhancing consumer satisfaction and attitudinal behaviors toward the technology. The results of our study suggest food retailers to consider chatbot commerce on their channels to be able to engage customers at any time. The enhanced satisfaction experienced by the consumer when interacting with an anthropomorphically designed chatbot during the online shopping process might be transferred to the retailer and also to the product portfolio. Food retailers need to assess the appropriate combination of conversational and visual representation of their chatbot agents to match the context and their brand identity. When implementing chatbot technologies on an e-commerce platform, attention must be paid to the appropriate environment, the desired goals, the way information is presented, as well as user feedback, and the choices offered to users. Specifically, it is crucial that the technology is tailored to the food retailer's industry and target audience. In a non-food industry context, platform visitors may have different needs and would not experience the same level of enjoyment and satisfaction with anthropomorphic chatbot design cues as opposed to on the food-retailer's channel. Additionally, the technological implementation must work flawlessly, as one of the possible drawbacks to be eliminated is miscommunication with a digital agent [71]. A chatbot interacting with many consumers might entail greater consequences on brand perception than a conversation with a retail salesperson. Chatbot commerce must not be designed and implemented with technology alone in mind, but requires a far more nuanced approach, e.g., tech companies like Google and Amazon have already taken steps to eliminate gender bias in conversational design [73]. Identifying appropriate opportunities, incorporating the human touch, and navigating a growing list of security, ethical, and moral tensions cannot be ignored. Equipping chatbots with anthropomorphic features not only transmits senses of humanness, but also influences consumers' perceptions of the underlying brand or organization. In turn, the retailers' overall competitiveness might improve [65]. In sum, appropriate chatbot deployment can enhance immediate customer satisfaction, company ratings, and purchase intentions if the chatbot is deployed according to consumers' needs [18]. Chatbot commerce as part of the digital transformation in retail has great research prospects that could enrich not only the big players in the market, but the consumers as well.

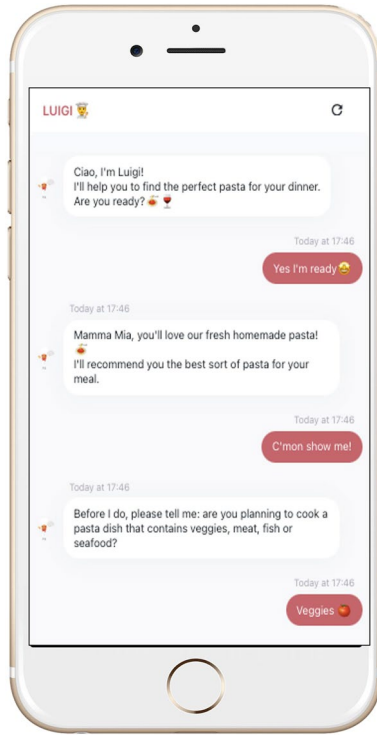
Appendix: Questionnaire items

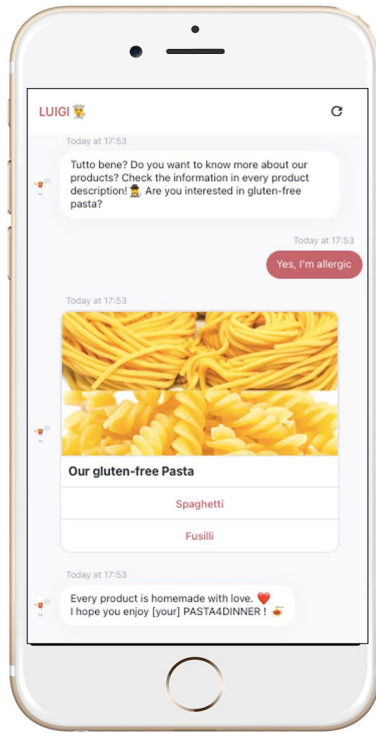
Variable	Item	No	Ref
Anthro-pomorphic design cues (ADC)	Using this chatbot gives me a feeling of personal communication	ADC_1	Go & Sundar [31]

Variable	Item	No	Ref
	Using this chatbot gives me a feeling of sociability	ADC_2	
	Using this chatbot gives me a feeling of human warmth	ADC_3	
	Using this chatbot gives me a feeling of human contact	ADC_4	
	Using this chatbot gives me a feeling of human sensitivity	ADC_5	
	Using this chatbot gives me a feeling of being present with someone	ADC_6	
	This chatbot behaves human-like	ADC_7	Nowak & Rauh [57], Goetz et al. [32]
	This chatbot shows human characteristics	ADC_8	
	This chatbot behaves emotionally	ADC_9	
	Customer Satisfaction (CS)	I am satisfied with this chatbot	CS_1
I am content with this chatbot		CS_2	
This chatbot did a good job		CS_3	
This chatbot did what I expected		CS_4	
I am happy interacting with this chatbot		CS_5	
I am satisfied with my overall experience using this chatbot		CS_6	
I am satisfied with the chatbot's service		CS_7	
I would recommend others to use this chatbot		CS_8	
Perceived Enjoyment of the chatbot (PE)	Using this chatbot is fun	PE_1	Mikalef et al. [53]
	Using this chatbot is exciting	PE_2	
	Using this chatbot is entertaining	PE_3	
	Using this chatbot is delightful	PE_4	
	Using this chatbot is enjoyable	PE_5	
	Using this chatbot makes me happy	PE_6	
Trust(-worthiness) toward (of) the chatbot (TW)	This chatbot cares about the consumer's needs	TW_1	Zarantonello and Pauwels-Delassus [82]
	This chatbot keeps its promises	TW_2	

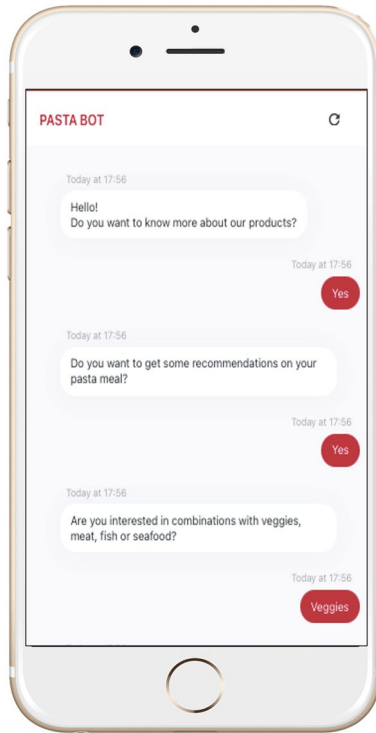
Variable	Item	No	Ref
Attitude toward the chatbot (AT)	This chatbot is able to contribute to the consumer's well-being	TW_3	
	I have no doubt this chatbot can be trusted	TW_4	
	This chatbot is trustworthy	TW_5	
	I trust this chatbot	TW_6	
	This chatbot in the context of online shopping seems like a good idea	AT_1	Venkatesh et al. [75]
	This chatbot makes the webshop more interesting	AT_2	
	Using this chatbot on the webshop is fun	AT_3	
	This chatbot makes a friendly impression on me	AT_4	Spears et al. [71]
	Interacting with this chatbot is a positive experience	AT_5	

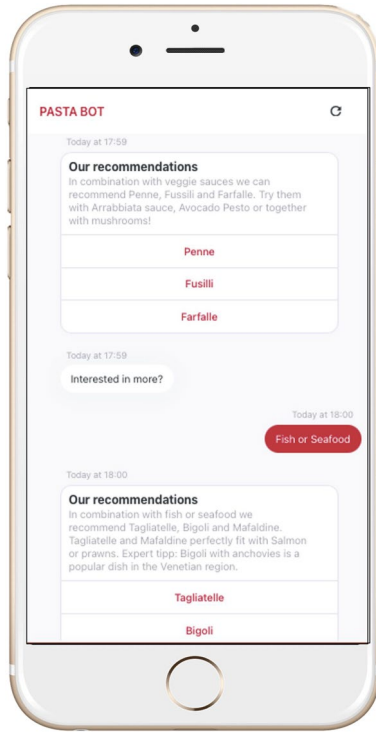
Chatbot conversation (A) Luigi

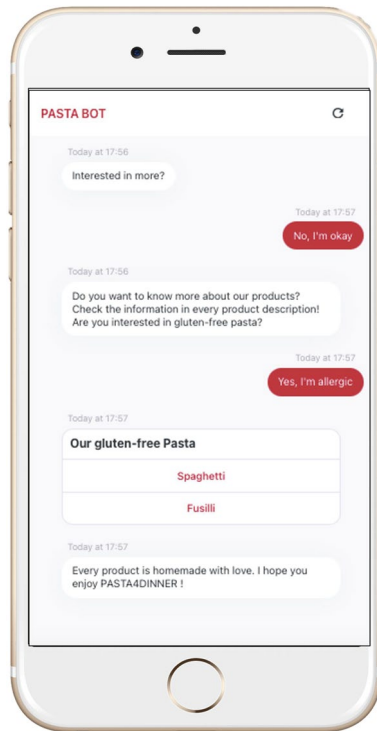




Chatbot conversation (B) Standard chatbot







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Declarations

Conflict of interest On behalf of all authors, the corresponding author states that there are no conflicts of interest.

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