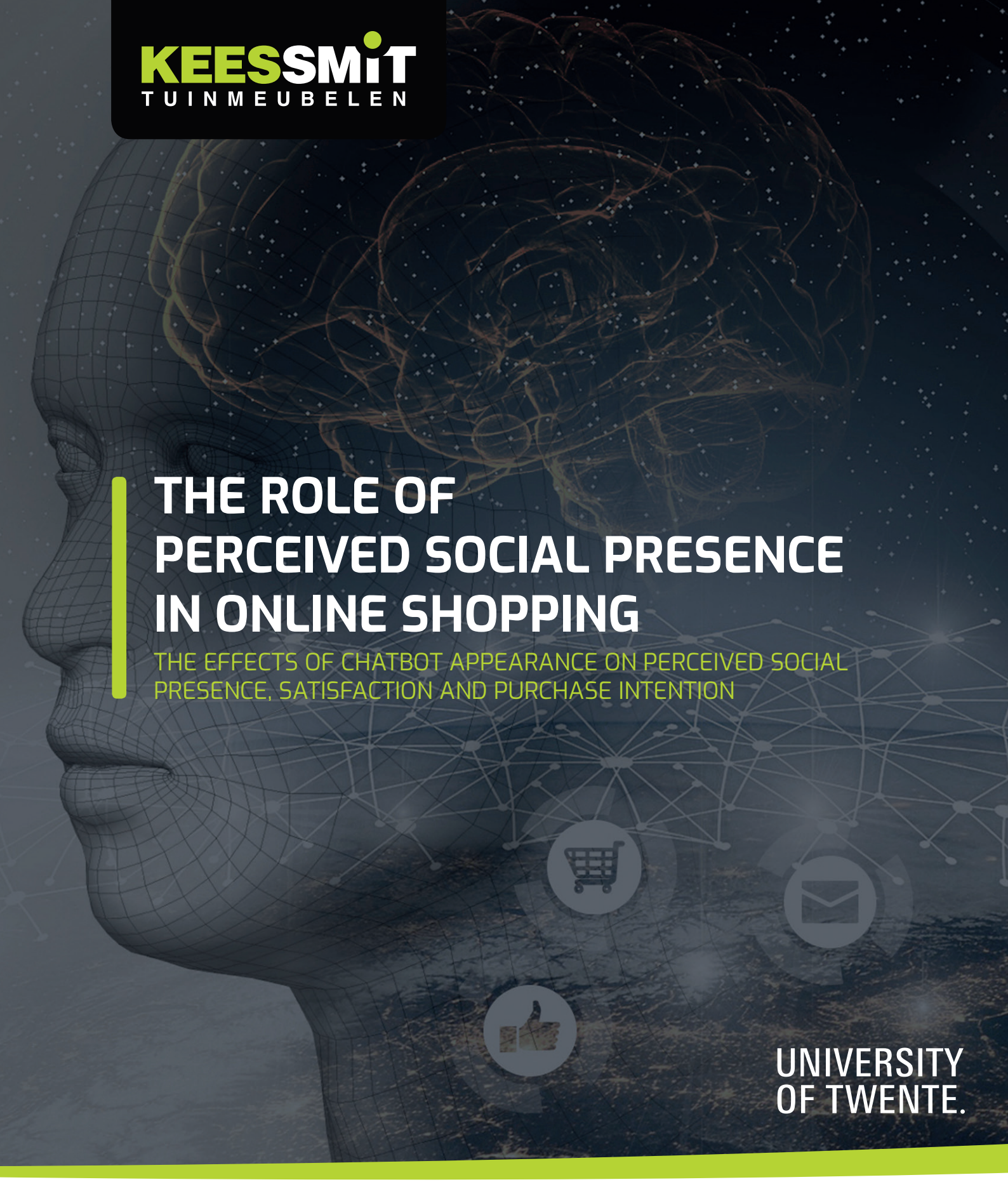
KEESSMIT
TUINMEUBELEN



THE ROLE OF PERCEIVED SOCIAL PRESENCE IN ONLINE SHOPPING

THE EFFECTS OF CHATBOT APPEARANCE ON PERCEIVED SOCIAL PRESENCE, SATISFACTION AND PURCHASE INTENTION

UNIVERSITY OF TWENTE.

FINAL THESIS SUBMITTED FOR THE DEGREE OF MASTER OF SCIENCE IN COMMUNICATION STUDIES MARKETING COMMUNICATION

Elise Schurink
February 2019

Faculty of Behavioral Management and Social Sciences (BMS)

EXAMINATION COMMITTEE

Dr. Ardion Beldad
Dr. Sjoerd de Vries

The role of perceived social presence in online shopping

The effects of chatbot appearance on perceived social presence, satisfaction and purchase intention

Final thesis submitted for the degree of Master of Science in Communication Studies

Name:	Elise Schurink
Student number:	S1959484
E-Mail:	a.e.schurink@student.utwente.nl
Master Specialization:	Marketing Communication
Course:	Research Topics
Supervisor:	Dr. A. D. Beldad
Second supervisor:	Dr. S. A. De Vries
Date:	February 13, 2018

Total number of words: 10.799

Abstract

These days, Artificial Intelligence (AI) is everywhere: on mobile phones, the Internet, and even in some everyday household items. It transformed consumers' everyday life, including how they interact with organizations. Consequently, big brands increasingly implement intelligent chatbots to automate the online interaction with their customers to increase satisfaction and to reduce costs. Due to the distant nature of an online environment, feelings of social presence have been quite hard to convey. Based on the social response theory, chatbots seem an excellent instrument to address the lack of interpersonal interaction and to exhibit feelings of social presence. Using an experimental 2x3 research design with actual chatbots, this study explores the extent to which chatbot appearance and task complexity can influence perceptions of social presence. Moreover, this study examines the relevance of chatbot appearance, task complexity and social presence to important designer- and organizational-related outcomes, such as satisfaction and purchase intention. Data is collected with an online survey among 135 respondents.

Keywords: chatbot appearance, social presence, satisfaction, purchase intention, online environment

Table of contents

1. Introduction

Chatbots have developed over time, and now they are the future of online customer service (Hervouët, 2017). In a survey from Aspect (2016), 49 per cent of 1000 consumers would prefer customer service interactions to be conducted via intelligent chatbots. Chatbots are defined as computer-generated characters that are able to interact with consumers and simulate behavior of human company representatives through artificial intelligence (Cassel, Sullivan, Prevost, & Churchill, 2000). As advances in artificial intelligence (e.g., chatbots) continue, big brands, such as Spotify, Mastercard and Pizza Hut, increasingly implement intelligent chatbots to automate the interaction with their customers to increase customer satisfaction and to reduce costs (Radziwill & Benton, 2017; Gartner, 2018). Also in the Netherlands, chatbots are gaining popularity. Recently, a few big brands, such as KLM, ASR and Bol.com, started using chatbots to provide 24/7 customer service (Tindemans, 2018).

Although chatbots are gaining popularity, their adoption and use is growing much slower than expected (Simonite, 2017). One key difficulty to the adoption and use of chatbots is that the interaction with them generally does not feel natural and human-like (Schuetzler, Grimes, Giboney, & Buckman, 2014). Nevertheless, there are limited established design principles for developing chatbot interactions that feel natural to the user (McTear, 2017). Previous research on the design of web sites and chatbots recommends that integrating social cues make the interaction feel more natural and human-like, and positively affects users' perceived social presence (Qiu & Benbasat, 2009). However, it has been found that social cues could have an opposite effect, especially when they irritate users or overplay the system's actual capabilities (Louwerse, Graesser, Lu, & Mitchell, 2005).

Thus, when looking into deploying chatbots, it is important to think about the social cues that will actually support and enhance the customer experience. A design feature that has been used to make chatbot interactions appear more natural, human-like and familiar to the user is about the appearance of the chatbot (Appel, Pütten, Krämer, & Gratch, 2012). Indeed, in a recent study involving 7000 consumers in America, Europe, and Asia, Forrester (2017) found that appearance matters when it comes to picking an organizations' representative (Singh, 2017): 46 per cent of the polled consumers said that they want a chatbot with a human appearance, while only 20 per cent would want to see them as an animated picture. Nevertheless, most of

the brands are creating animated images for their chatbots, while consumers prefer a human appearance (Amdocs, 2017).

So, in this study the effects of a human and animated appearance and an organizational logo will be examined. To the best of the researchers' knowledge, no other research has examined the effects of manipulating appearances (human or animated appearance or organizational logo) in human-chatbot interaction. Moreover, there is lack of knowledge on whether the use of different chatbot appearances influences user perceptions of chatbot interfaces differently. To discuss this gap, this research focuses on the theory of social presence, as this theory is identified as an essential factor in the design of chatbots in an online environment (Gnewuch, Adam, Morana, & Maedche, 2018). Additionally, social presence refers to the degree to which users perceive one as being present via the mediated interface (Gunawardena & Zittle, 1997; Lim, Hwang, Kim, & Biocca, 2015). Moreover, social presence occurs when users do not notice the para-authenticity of mediated humans and/or the artificiality of simulated non-human social actors (Lee, Jung, Kim, & Kim, 2006). Previous research on social presence has shown that pictures can convey a personal presence in the same way as personal photographs can (Gefen & Straub, 2003; Riegelsberger, Sasse, & McCarthy, 2003).

Additionally, chatbot appearance is used to make perceived social presence more concrete. Specifically, it is assumed that a human appearance is high in perceived social presence and the use of an organizational logo low in perceived social presence. Moreover, research has found that the perception of high social presence positively influences satisfaction and purchase intentions (Hassanein & Head, 2007; Cyr, Hassanein, Head, & Ivanov, 2007; Lu, Fan, & Zhou, 2016), particularly in the domain of customer services in which chatbots are increasingly used (Gartner, 2018). However, a variety of variables (Kehrwald, 2008) are found to impact social presence negatively, such as task complexity (Tu, 2002; Steinfield, 1986). Indeed, research has found that task complexity increases feelings of helplessness (Perrewé & Mizerski, 1987), which results in a lower level of perceived social presence (Xu, 2016). Therefore, it is assumed that seeing a chatbot with a human appearance is preferred while performing an uncertain and complex task, in order to decrease the feelings of helplessness. Thus, task complexity is added as a moderator. It is also assumed that social presence is perceived differently between two age groups of respondents, as follows digital natives and digital immigrants. So, age of the respondents is also added as a moderator.

Consequently, the following research questions have been proposed:

> *"What are the effects of chatbot appearance on social presence, satisfaction and purchase intention?"*
>
> *"What are the effects of chatbot appearance, moderated by task complexity, on social presence, satisfaction and purchase intention?"*
>
> *"What are the effects of chatbot appearance, moderated by age of the respondents, on social presence, satisfaction and purchase intention?"*
>
> *"What are the effects of chatbot appearance, mediated by perceived social presence, on satisfaction and purchase intention?"*

The challenge to deploy a visually appealing chatbot to consumers becomes increasingly relevant given the fact that interactions between organizations and consumers are "gradually evolving to become technology dominant (i.e., intelligent assistants acting as a service interface) rather than human-driven (i.e., service employee acting as service interface)" (Larivière, Bowen, Andreassen, Kunz, Sirianni, & Voss, 2017). Additionally, insight into how to best represent a chatbot is important, as it does not only increases the organizations' conceptual knowledge of chatbots, but also reduces effort, time, and cost to design, implement, and maintain such a chatbot as well as to shape the chatbot interface (Verhagen, Nes, & Feldberg, 2014).

This study is divided in different sections. First, the independent and dependent variables are elaborated in chapter two, followed by the hypotheses and research model. Next, a description of the research methodology is presented in chapter three. Then, the research results are presented in chapter four, which is followed by a discussion, conclusion and the limitations of this study in chapter five.

2. Theoretical framework

In this chapter, the definitions and theories about the research variables are conceptualized. These definitions and theories support the development of the hypotheses.

2.1 Previous research on chatbots

Previous research has found that humans respond socially to computers that show human-like characteristics (Nass, Steuer, & Tauber, 1994). According to the Computers are Social Actors (CASA) paradigm, users apply social rules and expectations in their interaction with computers when they are confronted with social cues, for example a human-like appearance. Related to the CASA paradigm, many researches have examined how users react to different social cues from computers, robots, websites (Wakefield, Wakefield, Baker, & Wang, 2011), and recommendation agents (Qiu and Benbasat, 2009). Additionally, researches have been conducted in the context of chatbots to investigate the effects of visual cues (Appel et al., 2012) or verbal cues (Schuetzler, Grimes, Giboney, & Buckman, 2014). These studies have found that social cues positively influence user perceptions of chatbots (e.g., social presence). However, it has been found that social cues could have an opposite effect, especially when they irritate users or overplay the system's actual capabilities (Louwerse, Graesser, Lu, & Mitchell, 2005). Therefore, design features that represent social cues need to be designed carefully to reduce possible negative impacts (Fogg, 2002). As such, organizations face a challenge in designing a chatbot (Kim, 2002), as the interaction with them generally does not feel natural and human-like (Schuetzler, Grimes, Giboney, & Buckman, 2014). Specifically, organizations have to understand how to best introduce their chatbot to consumers and the extent to which the social cues used to these chatbots contributes a natural and human-like feeling.

A design feature that has been used to make chatbot interactions appear more natural and familiar to the user is about the appearance of the chatbot (Appel, Pütten, Krämer, & Gratch, 2012). Indeed, recent research from Forrester (2017) has shown that appearance matters when picking an organizations' representative: 46 per cent of the polled consumers said that they want a chatbot with a human appearance, while only 20 per cent would want to see them as an animated picture. Nevertheless, most of the brands are creating animated images for their chatbots, while consumers prefer a human appearance (Amdocs, 2017). Indeed, Gefen and Straub (2003) found that most online stores tend to display their products with little or no social

appeal. They are usually accompanied by descriptions or animations that are functional and unemotional. For example, Bol.com uses an animated picture of Billie as the organizations' representative, while the chatbot from KLM is represented by the organizations' logo. Although, Hanson Robotics, an organization that deploys robots, created recently a robot with a human appearance named Sophia (Urbi, 2018). Chief scientist Ben Goertzel from Hanson Robotics states that young adult female robots became really popular and that is the reason why they deployed a robot with a human appearance. The development of Sophia shows that robots (e.g., chatbots) with a human appearance are gaining more popularity (Goertzel, 2018).

In this research, chatbot appearance (human or animated appearance or organizational logo) is used as a social cue that enriches perceptions of social presence, as it has been identified as an important factor in the design of chatbots in an online environment. More specifically, this research believes that chatbot appearance is a factor that describes social presence. However, due to the distant and computer-mediated nature of online environments, feelings of social presence have been quite hard to convey online. Empowered by developments in self-service technology, the rise of chatbots has provided new perspectives on this issue. Building on the social response theory (Nass & Moon, 2000), researchers have put forward that chatbots can fulfill the role of service representatives and replace tasks historically performed by human service personnel (Meuter, Ostrom, Roundtree, & Bitner, 2000). For this reason, chatbots seem an excellent instrument to address the lack of interpersonal interaction recognized in online settings and to exhibit feelings of social presence, thereby responding to the call for integration between technology and personal aspects in online environments (Berry, 1999). In the next paragraph, the theory of social presence will be discussed.

2.2 Social presence

In mediated communication, perceived social presence refers to the degree to which users perceive one as being present via the mediated interface (Gunawardena & Zittle, 1997; Lim, Hwang, Kim, & Biocca, 2015). The theory of social presence is used to understand how feelings of human contact can be created without actual human contact (Gefen & Straub, 2004). Previous research has shown that social cues, such as a human-like appearance, create perceptions of social presence (Qui & Benbasat, 2009). Additionally, visual senses dominate users' perceptions and visual media have more social presence than written media (Short, Williams, & Christie, 1976). These perceptions are the consequences of an unconscious

process, in which users react to technologies as if they were human, although knowing that they are interacting with a machine (Nass et al., 1994). In this research, perceived social presence will be measured with the use of a human or animated picture or the use of an organizational logo. It is assumed that a chatbot with a human appearance yields greater feelings of perceived social presence than an animated or organizational logo chatbot.

Moreover, perceived social presence has been identified as an important driver of satisfaction and purchase intention (Gunawardena & Zittle, 1997; Cyr, Hassanein, Head, & Ivanov, 2007). For these reasons, the effects of social presence on satisfaction and purchase intention are elaborated in the next paragraph.

2.2.1 Satisfaction

The most prominent psychological impact of social presence is perhaps satisfaction (Lombard & Ditton, 1997). For the purpose of this study, satisfaction is assumed to be "an evaluation of an emotion" (Hunt, 1977), suggesting that it "reflects the degree to which a consumer believes that the possession and/or use of a service or product evokes positive feelings" (Rust & Oliver, 1994). Creating satisfaction in general brings about many benefits for organizations, as satisfied customers are less price sensitive, tend to buy additional products, are less influenced by competitors, and stay loyal for a longer time (Fornell, 1992). Hence, companies that provide high satisfaction levels will profit from this reputation in the future (Anderson & Sullivan, 1993).

Additionally, Gunawardena and Zittle (1997) researched the effects of social presence on satisfaction within a computer-mediated form of communication. They found that social presence explains about 60% of the variance of satisfaction, thus concluding that social presence is a strong predictor of satisfaction in online environments. In addition, Richardson and Swan (2003) examined the effects of social presence and students' satisfaction in an online learning environment and found that students' perceived social presence significantly strengthened their satisfaction. Other research has found that high perceived social presence positively impacts the enjoyment of shopping websites, leading to satisfaction with the interface (Etemad & Sajadi, 2016; Hassanein & Head, 2005; Cyr, Hassanein, Head & Ivanov, 2007; Lu, Fan, & Zhou, 2016). For these reasons, the effects of chatbot appearance, mediated by social presence, on satisfaction will be measured. It is assumed that a chatbot with a human appearance

is perceived as high in social presence, and, thus, will lead to higher satisfaction, compared to an animated appearance or the organizational logo.

Additionally, research has found that satisfaction is a predictor of purchase intentions (Zeithaml, Berry, & Parasuraman, 1996; McQuitty, Finn, & Wiley, 2000). For this reason, purchase intention will be discussed in the next paragraph.

2.2.2 Purchase intention

Grewal, Monroe, and Krishnan (1998) defined purchase intention as "a probability that lies in the hands of the customers who intend to purchase a particular product". According to the Theory of Planned Behavior (Azjen, 1991), behavioral intention is the most influential predictor of behavior. Hence, purchase intention is used to predict purchase behaviors. Indeed, research has found that there is a significant relationship between purchase intention and actual purchasing (Morwitz, Steckel, & Gupta, 2007).

Moreover, organizations are interested in purchase intentions in order to predict future sales of existing and/or new products and services. Data about purchase intentions can help organizations in their marketing decisions related to product demand, market segmentation and promotional strategies (Tsiotsou, 2006). Consequently, online purchase intention is seen as a key factor that can predict the effectiveness of online stimuli (e.g., chatbot appearance) (Amaro & Duarte, 2015; Lu, Fan, & Zhou, 2016).

Related to the social presence theory, research has found that online consumers' perceptions of social presence positively influence their subsequent intention to purchase from a commercial website (Gefen & Straub, 2003). Additionally, other researches show that higher levels of perceived social presence positively impact the intentions to purchase online (Hassanein & Head, 2005; Cyr, Hassanein, Head, & Ivanov, 2007; Lu, Fan, & Zhou, 2016). For these reasons, the effects of chatbot appearance, mediated by social presence, on purchase intention will be measured. It is assumed that a chatbot with a human appearance is perceived as high in social presence, and, thus, will lead to higher intentions to purchase, compared to a chatbot with an animated appearance or the organizational logo.

2.3 Moderating role of task complexity

A variety of variables (Kehrwald, 2008) are found to impact social presence negatively, such as task complexity (Tu, 2002; Steinfield, 1986). For the purpose of this study, perceived task complexity is defined as "the degree of complicated actions needed to complete a task" (Psychology Dictionary, 2013). In this study, the researcher examined the effect of task complexity from the perspective of the number of different actions the chatbot has to perform to answer a question from a consumer. Additionally, it is assumed that questions have different levels of complexity, ranging from questions that can be answered within one action (e.g., simple task), to those questions that can be answered with more complicated actions (e.g., complex task). Specifically, simple tasks require processing fewer actions than complex tasks (Payne, 1982).

Related to the social presence theory, when task complexity is perceived to be high (vs. low), it is likely that perceived social presence would be low, with other things staying the same (Xu, 2016). The cognitive psychology literature (Payne, Bettman, & Johnson, 1988) demonstrates that consumers respond in a different manner when confronted with various levels of task complexity, for example, simple versus complex (Norman, 1986). Existing research has found that high perceived task complexity results in emotional discomfort, especially the fear of missing out important information (Kamis, Koufaris, & Stern, 2008). Additionally, other researches show that high task complexity increases consumers' frustration and confusion (Speier & Morris, 2003), stress (Rangarajan, Jones, & Chin, 2005), and even feelings of helplessness (Perrewé & Mizerski, 1987). In a helpless situation, consumers are more likely to perceive that the website lacks a feeling of social presence. They might make external acknowledgments by presuming that a website is not assisting them in helping accomplish their shopping goal. Consequently, they perceive a lower level of social presence from the website (Xu, 2016), and, as a result, a user will be less satisfied with the chatbot interface. Also, the intention to purchase will decrease, as a direct effect of satisfaction on purchase intention was found (Zeithaml et al., 1996; McQuitty et al., 2000).

Concluded, in a helpless situation, consumers want to perceive high social presence to get the feeling that the chatbot is assisting them in helping accomplishing their shopping goal. Therefore, it is assumed that respondents prefer a chatbot with a human appearance when performing a complex task, as the chatbot with a human appearance is perceived as high in social presence. Contrarily, a chatbot with an organizational logo is preferred when consumers

perform a simple task. Indeed, Tiamiyu (1992) and Daft, Sormunen and Parks (1988) found in their studies that media higher in social presence (i.e., chatbot with a human appearance) are preferred in unclear and helplessness situations. Therefore, it is assumed that task complexity could moderate the effect of chatbot appearance on social presence, satisfaction and purchase intention.

2.4 Moderating role of age

Most researches in computer mediated communication focus on digital natives who are generally more familiar with technology (Taylor, 2002; Harris, Bailenson, Nielsen, & Yee, 2009). Digital natives are usually considered early adopters of new technologies and services (Furini, 2013). Digital immigrants, whose abilities, interests and experiences differ greatly from those of the typical virtual world users, may have different perceptions on presence and communication in an online environment (Siriaraya & Siang Ang, 2012; Felnhofer, Kothgassner, Hauk, Beutl, Hlavacs, & Kryspin-Exner, 2014). For these reasons, it is important for organizations to understand the different perceptions and expectations between digital natives and digital immigrants, so organizations can provide better design and features for their chatbots.

Siriaraya and Siang Ang (2012) investigated age differences in the perception of social presence in computer mediated communications. The researchers found that digital immigrants reported significantly lower levels of social presence than digital natives. Additionally, digital immigrants who communicated with a non-human avatar reported a lower level of satisfaction in their social experience, compared to those who communicated with a human-like avatar (Siriaraya & Siang Ang, 2012). So, based on these results, it is assumed that digital immigrants prefer a chatbot with a human appearance to perceive a higher level of social presence, to be satisfied and have the intention to purchase. Contrarily, it is assumed that it does not matter for digital natives how the chatbot looks like to perceive social presence.

In this study, two age groups will be compared, as such “digital natives” with the age from 18 till 29 years, and “digital immigrants” with the age from 30 till 70 years.

2.5 Hypotheses

Based on the findings from previous sections, the following hypotheses have been formulated:

H1: The perception of (a) social presence, the level of (b) satisfaction, and (c) purchase intention, is higher when people are confronted with a chatbot using a human picture compared to people using a chatbot with an animated picture or organizational logo.

H2: The perception of (a) social presence, the level of (b) satisfaction, and (c) purchase intention is higher when people are confronted with a chatbot using an animated picture compared to people using a chatbot with an organizational logo.

H3: The use of a human chatbot when people are performing a complex task will result in higher levels of (a) social presence, the level of (b) satisfaction, and (c) purchase intention, than the use of an animated chatbot or the use of a chatbot with only an organizational logo.

H4: The use of a human chatbot will result in higher levels of (a) social presence, the level of (b) satisfaction, and (c) purchase intention among digital immigrants, compared to digital natives.

H5: The effects of chatbot appearance on (a) satisfaction, and (b) purchase intention are mediated by perceived social presence.

2.6 Research model

To investigate the impact of chatbot appearance and task complexity on the perception of social presence within an online shopping environment and to examine its effect on satisfaction and purchase intention, the following research model is depicted in figure 1.

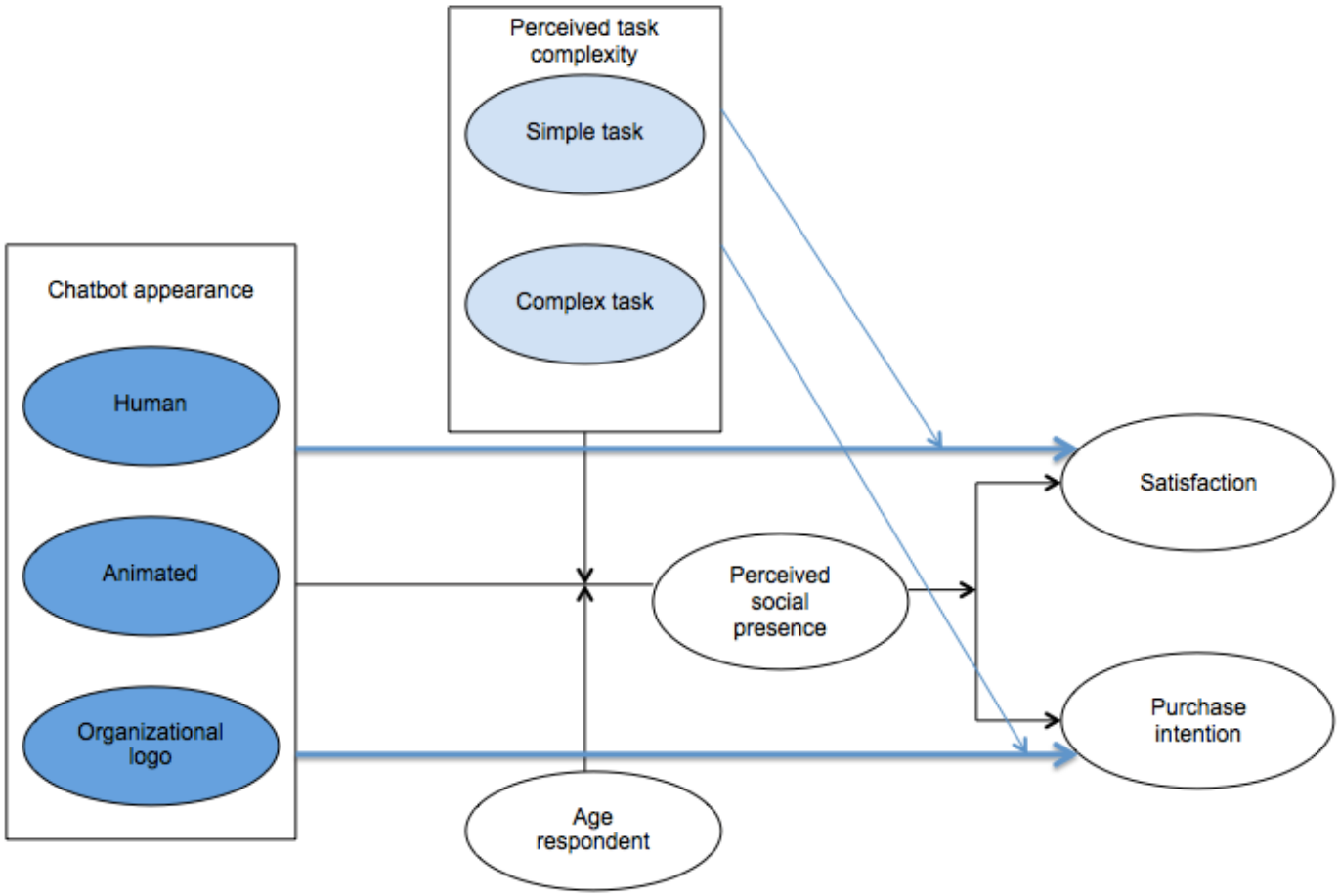


Figure 1. Research model of the expected effects

3. Method

In this section, the experimental design will be discussed first. Next, more about the respondents, stimulus materials, measurements and validity and reliability will be discussed.

3.1 Experimental design

The combined conditions of this research are visualized in the 2 (task complexity, e.g., simple versus complex task) by 3 (chatbot appearance, e.g., human, animated or organizational logo) experimental design in figure 2.

Task complexity		Chatbot appearance		
		Human	Animated	Organization logo
	Simple task	Conversation 1	Conversation 2	Conversation 3
	Complex task	Conversation 4	Conversation 5	Conversation 6

Figure 2. 2x3 Experimental design resulting in six conditions

3.2 Stimulus materials

To investigate the effects of chatbot appearance on social presence, satisfaction with the chatbot interface and purchase intention, three different chatbots will be developed: (1) a chatbot with a human appearance, (2) a chatbot with an animated appearance, and (3) a chatbot that appears the organizational logo. These three chatbots have to perform a simple and a complex task. As a result, six conditions are created. Each respondent will randomly be assigned to one of the chatbots. The experiment stimulates an online purchase of garden furniture on the web shop of Kees Smit Tuinmeubelen. The chatbots will be used to help the respondents find the right information (simple task) or the right product (complex task). To measure the effects of task complexity, two tasks that differ fundamentally from each other will be compared. Task 1 will focus on a simple task, whereby the users' problem has to be solved. Task 2 will be more focused on a complex task, whereby the chatbot will take the form of an advisor. The tasks that will be used during the chatbot interfaces are:

1. Task 1 (simple task), such as answering a question with basic information;
2. Task 2 (complex task), such as giving advice for a specific request.

3.3 Design stimuli

In order to study if chatbot appearance has an effect on satisfaction with the chatbot interface and if task complexity moderates this effect, a pre-test was performed. The pre-test was also performed to avoid possible side effects as much as possible. The aim of the pre-test was to select relevant stimuli for the main study. The first pre-test was conducted to select an appropriate female chatbot for the human condition and animated condition. The second pre-test was performed to select a simple and complex task. The goal was to find a human and animated chatbot and a simple and complex task that could be used during the chatbot interface in the main study.

3.3.1 Pre-test chatbot appearance

Three pictures of females were used for the pre-test. The females were selected because of their appearance that fits to the brand Kees Smit Tuinmeubelen. Figure 3 shows how these females look like. Three animated chatbots were designed on the basis of the pictures from the three females. The animated chatbots are showed in figure 4.

1.  2.  3. 

Figure 3. Appearance human chatbots

Figure 4. Appearance animated chatbots

A non-probability sample of 15 Dutch family members and friends participated in the pre-test. The respondents were exposed to the human chatbot and the animated chatbot. Respondents had to rate two key concepts in human robot interaction (HRI), as follows: anthropomorphism and animacy (Bartneck, Kulic, Croft, & Zoghbi, 2008). With these concepts, the respondents' perceptions of robots (e.g., chatbots) could be measured. The results have been distilled into a consistent Godspeed questionnaires using 5-point scales. For example, respondents had to rate the item anthropomorphism from 1 = fake till 5 = natural, and the item animacy from

1 = mechanical till 5 = organic. Appendix 3 shows the application of the Godspeed complete questionnaires using 5-point scales.

The results show that human chatbot number 3 (M = 3.73, SD = 1.12) scored the highest mean scores on the concepts of anthropomorphism and animacy, compared to chatbot number 1 (M = 3.34, SD = 0.92) and chatbot number 2 (M = 3.03, SD = 0.73) (Figure 3). For this reason, chatbot number 3 from figure 3 will be used in the main study. The mean scores from the pre-test can be found in appendix 5.

3.3.2 Pre-test task complexity

To investigate which tasks are relevant for the main study, tasks from the customer service department of Kees Smit Tuinmeubelen were analyzed. To understand how the tasks are different from each other, the tasks have been divided into two categories for the purpose of this study, namely:

1. Simple task, such as answering a question with basic information. During a simple task, there are no complicated actions needed to complete the task. For example, the chatbot is asked to give the shipping time of an order;
2. Complex task, such as giving advice for a specific request (which pillow is recommended in a couch out of wood?). To complete the complex task, more complicated actions are needed, such as giving advice for a specific product. In this case, the respondent had to ask multiple questions to complete the task.

This categorization is derived from the content that Kees Smit Tuinmeubelen assigns to a specific type of task.

A non-probability sample of 14 Dutch family members and friends participated in the pre-test. To measure task complexity in the pre-test, a post task questionnaire was used, where respondents were exposed to one simple or complex task. After seeing the task, respondents had to rate if they disagree or agree (1 till 5) with four items (Maynard & Hakel, 1997), for example “The task I am doing with the chatbot is complex”. Appendix 4 shows the complete questionnaire using 5-point scales.

An independent samples t-test was conducted to ensure that there were significant differences between the two tasks, so the tasks could be assigned as a simple and complex task. The results show that there was a significant difference between the four items, (1) complex; $t(26) = -3.61$, $p < 0.001$, (2) challenging; $t(26) = -5.61$, $p < 0.001$, (3) mentally demanding; $t(26) = -4.24$, $p < 0.001$, and (4) problem solving $t(26) = -5.10$, $p < 0.001$. This means that the respondents recognized the two task types.

3.4 Final stimuli

For the main study, six conditions with a human and animated appearance and the organizational logo were designed to manipulate the independent variables, chatbot appearance and task complexity. Every chatbot could perform a simple or complex task. The respondents were exposed in random order to one of the chatbots wherein they have to perform a simple or complex task. These chatbot interfaces were created to make sure that the respondents could be placed in the six conditions of the 2x3 experimental design. So, during the main study, the respondents had to perform a simple or complex task while seeing a human, animated or organizational logo chatbot. Figure 5 shows the human, animated and organizational logo chatbot with a complex and simple task. Appendix 6 gives an overview of the six chatbot interfaces.

Figure 5. Human, animated and organizational logo chatbot with a complex (first three) and simple task

3.5 Manipulation check

3.5.1 Chatbot appearance

A manipulation check was conducted to test if the manipulation about chatbot appearance shows a significant difference. An ANOVA analysis was conducted to determine the differences between the three chatbot types, as follows, human, animated and the organizational

logo. The respondents evaluated 7 items about chatbot appearance on a 5-point Likert scale. Results showed a significant difference between the groups (M = 3.44), with F (2, 132) = 16.55, $p < 0.001$. Additionally, a Post Hoc test was performed to confirm where the differences occurred between the groups. The results from the Post Hoc test revealed that there is a significant difference between the human and animated chatbot, $p < 0.001$, and the human and organizational logo chatbot, $p < 0.001$. However, there is no significant difference between the animated and organizational logo chatbot, $p = 0.513$. These results suggest that the human chatbot is perceived as more human than the animated and organizational logo chatbot. Nevertheless, respondents did not see a difference in anthropomorphism and animacy between the animated and organizational logo chatbot.

3.5.2 Task complexity

Subsequently, this research created two task types, as follows a simple and complex task. An independent samples t-test was conducted to ensure that there were significant differences between the two tasks, so the tasks could be assigned as a simple and complex task. The results show that there were significant differences between the complex task (M = 2.34, SD = 1.09) and the simple task (M = 1.74, SD = 0.93), with t(133) = 3.64, $p < 0.001$. This means that the respondents recognized the two task types, so the tasks could be assigned as a simple and complex task. However, despite the differences, the complex task (M = 2.34, SD = 1.09) is not perceived as really complex compared to the 5-point Likert scale.

3.6 Respondents

The target group of the main study were Dutch consumers between 18 and 70 years. Through a non-probability sample, family members and friends of the researcher participated in the questionnaire. In total, 202 respondents started the questionnaire.

First, the respondents had to answer two questions, whether they saw a human or an animated chatbot. Respondents, who did not recognize this manipulation, were deleted from the questionnaire. In the end, 135 respondents (66%) were useful for analysis. At the end of the survey, the age group of the respondents was asked. The respondents were collapsed into two age groups, as the two groups could be used for the moderator analysis. In table 5, a summary of the age groups of the respondents is given. The complete questionnaire can be found in appendix 7.

Table 5.

Age of the respondents

Age group	n	%
Digital natives (18 – 29 years)	63	46.7%
Digital immigrants (30 – 70 years)	72	53.3%

3.7 Procedure

The survey was created in Dutch, because all the respondents are Dutch. Even as the pre-test, the survey was implemented in the online survey tool Qualtrics. The complete questionnaire of the main study can be found in appendix 7. The respondents were asked via WhatsApp, E-Mail, Facebook, Facebook groups and LinkedIn to fill in the questionnaire. Before the respondents started the questionnaire, they had to read an instruction about the study. Then, respondents were asked if they wanted to fill in the questionnaire. If a respondent did not agree, the questionnaire would be closed. If a respondent did agree, he/she started the survey.

In the first place, respondents were in random order assigned to one of the six chatbots in Facebook Messenger. Here, the respondents had a conversation with the chatbot. During this conversation, the chatbot had to perform a simple or a complex task and respondents saw a human chatbot or an animated chatbot or a chatbot that appears the organizational logo. After the chatbot conversation, respondents were redirected back to Qualtrics.

Back in Qualtrics, a short instruction of the questionnaire was shown to explain what was asked of the respondents. The respondents were asked to give their opinion about the chatbot appearance and task complexity and the dependent variables, as follows (1) satisfaction, (2) purchase intention, and (3) social presence.

In the end, respondents were asked to fill in their age group. The answer to the age question was used to delete respondents who were younger than 18 years. Also, this question was used to recognize the moderating variable age of the respondent.

After the respondents completed the questionnaire, an analysis in SPSS was done to check if the constructs and items were loaded correctly.

3.8 Measures

The questionnaire uses semantic differentiation 5-point scales and 5-point Likert scales. Altogether there were 23 questions on the survey. At the end of the survey, the age group was also collected. The complete questionnaire can be found in appendix 7.

Customer satisfaction

To measure customer satisfaction in an online environment, Anderson and Srinivasan (2003) employed Oliver's (1980) multi-item scale. This scale was modified to measure online visitor's satisfaction in the current study. These satisfaction items were measured in a three-item 5-point Likert scale ranging from "5" being "Strongly agree" to "1" being "Strongly disagree". The constructs can be found in appendix 8.

Purchase intention

The variable purchase intention was examined in a three-item 5-point Likert scale to measure to what extend respondents are willing to buy a product from Kees Smit Tuinmeubelen after the chatbot interface. The respondents were asked if they were willing to buy products from Kees Smit Tuinmeubelen (in the future), ranging from "5" being "Very likely" to "1" being "Very unlikely" (Gefen & Straub, 2004). The three-items reflect the online visitors' behavioural intentions in the near future and relatively long term (1 year). The constructs can be found in appendix 8.

Social presence

To measure the social presence of the respondents during the chatbot interface, 8 items were asked using a combination of 5-point semantic differential scales and independent 5-point scales, for example, unsociable/sociable; machinelike/lifelike, ranging from 5 till 1, or "While you were interacting with the chatbot, how much did you feel as if it were an intelligent being?" The constructs can be found in appendix 8.

Chatbot appearance

Respondents had to rate two key concepts in human robot interaction (HRI), as follows: anthropomorphism and animacy (Bartneck, Kulic, Croft, & Zoghbi, 2008). With these concepts, the respondents' perceptions of robots (e.g., chatbots) could be measured. The results have been distilled into a consistent 7-item Godspeed questionnaire using 5-point semantic scales. Appendix 3 shows the application of the Godspeed questionnaires using 5-point scales.

Task complexity

To measure task complexity, respondents had to rate if they disagree or agree (1 till 5) with four items (Maynard & Hakel, 1997), for example "The task I am doing with the chatbot is complex". Appendix 4 shows the questionnaire using 5-point Likert scales.

3.9 Validity

In order to prove if the study measured what it supposed to measure, a factor analysis was performed. In total 23 items, separated by six factors, were analysed whether they ended up in one construct.

First of all, table 6 gives an overview of the factor analysis, wherein the dependent variables, the number of valid items related to those variables, the explained variance, the eigenvalues and the Cronbach's Alpha are showed. The items from the variables chatbot appearance, task complexity, satisfaction, and purchase intention ended up in one construct. This means that these statements measured what it supposed to measure. However, one statement from social presence ended up in the construct from chatbot appearance. This means that the one statement from social presence did not measure what it was supposed to measure, and so, this statement is not valid. For this reason, the machinelike/life-like item from social presence is deleted in the further analysis, as a variable should ideally only load cleanly onto one factor.

Second, the explained variance is also showed in table 6. The total explained variance of all the variables is 70,44%. The amount of explained variance tells something about the degree to which the items form one component. Generally, the interpretation of explained variance gets explained by the rule of thumb, which says that a variance above 50% can be considered as good. According to table 6, the total of explained variance of the variables can be considered as good.

Last of all, the eigenvalues are showed in table 6. The eigenvalues show the factors by which compressions in a linear transformation act. In general, an eigenvalue above 1 is considered as good. Table 6 shows that all the eigenvalues are above 1, which means that the items are valid.

Cronbach's Alpha is explained in the next paragraph about reliability.

Table 6.

Validity factor analysis

	Factor				
Items	**1**	**2**	**3**	**4**	**5**
Appearance – Fake/Natural	0.812				
Appearance – Robot/Human	0.855				
Appearance – Artificial/Lifelike	0.861				
Appearance – Dead/Alive	0.725				
Appearance – Stagnant/Lively	0.641				
Appearance - Mechanic/organic	0.740				
Appearance – Inert/Interactive	0.555				
Task complexity – Not complex/Complex				0.825	
Task complexity – Not challenging/Challenging				0.724	
Task complexity – Not mentally demanding/Mentally demanding				0.870	
Task complexity – Not problem solving/Problem solving				0.864	
Satisfaction – I am satisfied		0.794			
Satisfaction – Good choice to ask the chatbot		0.734			
Satisfaction – Satisfied with the way the chatbot helped		0.780			
Purchase intention – Likely to buy					0.836
Purchase intention – Likely to buy within 3 months					0.875
Purchase intention – Likely to buy within 6 months					0.868
Social presence – Unsociable/Sociable			0.748		
Social presence – Insensitive/Sensitive			0.591		
Social presence – Intelligent being			0.716		
Social presence – Social being			0.812		
Social presence – Really communicating			0.497		
Explained variance:	42.47%	9.66%	7.34%	6.74%	4.23%
Eigenvalue:	11.47	2.60	1.98	1.82	1.16
Cronbach’s Alpha:	0.923	0.887	0.885	0.865	0.903

3.10 Reliability

The Cronbach's Alpha from the dependent variables is calculated to determine the internal consistency. The components can be clarified as reliable if the Alpha is equal or higher than 0.70.

Table 6 already showed the Cronbach's Alpha for each variable. The variables chatbot appearance, task complexity, satisfaction, purchase intention and social presence have a Cronbach's Alpha above 0.70. Concluded, these variables confirm sufficient internal consistency.

4. Results

This chapter describes the results of the main study. First of all, the analysis of variance is explained in paragraph 4.1. Second, paragraph 4.2 describes the main effect of the independent variable chatbot appearance. Third, paragraph 4.3 reports the interaction effect of chatbot appearance and task complexity. Then, in paragraph 4.4, the moderating effect of age is explained. Furthermore, the mediation effect of social presence is described in paragraph 4.5. Last of all, an overview of the hypotheses is given in paragraph 4.6.

4.1 Multivariate analysis of variance

In this study, a MANOVA analysis was used to examine the different effects of the independent variables on the dependent variables.

Before analyzing the results, a Wilks' Lambda was performed to test the general effect between the independent and dependent variables. Table 7 shows the descriptive statistics of the independent variables, chatbot appearance and task complexity. Regarding to the first main effect of this study, chatbot appearance, it can be concluded that there is a main effect of chatbot appearance, with $\Lambda = 0.870$, $F(6, 256) = 3.060$, $p = 0.007$. According to the second main effect of this study, task complexity, the significance value is $\Lambda = 0.952$, $F(3, 127) = 2.132$, $p = 0.099$, which means that there is no main effect of task complexity. Moreover, the interaction between those two main effects, chatbot appearance * task complexity, shows that there is no significantly interaction effect between chatbot appearance and task complexity, with $\Lambda = 0.963$, $F(6, 254) = 0.799$, $p = 0.572$.

Table 7.

Multivariate test; Descriptive statistics of the independent variables

Effect		Value	F	p
Chatbot appearance	Wilks' Lambda	0.870	3.060	0.007
Task complexity	Wilks' Lambda	0.952	2.132	0.099
Chatbot appearance * Task complexity	Wilks' Lambda	0.963	0.799	0.572

4.2 Main effect of chatbot appearance

The main effects of the independent variable, chatbot appearance, on the dependent variables (social presence, satisfaction and purchase intention) were measured using a multivariate analysis of variance (MANOVA).

4.2.1 Social presence

As can be seen in table 8, the effects between the independent variable and dependent variables were measured. These results show that there now is a main effect between chatbot appearance and social presence, with $p = 0.036$ (F = 3.423). A Bonferroni analysis shows that there is a significant difference between the human chatbot ($M = 3.31$, $SD = 0.97$) and the animated chatbot ($M = 2.84$, $SD = 0.84$), with $F(2, 132) = 2.953$, $p = 0.049$, but there is no significant difference between the human chatbot and the organizational logo ($M = 3.09$, $SD = 0.90$), with $F(2, 132) = 2.953$, $p = 0.695$. Moreover, there is no significant difference between the animated chatbot and the organizational logo, with $F(2, 132) = 2.953$, $p = 0.641$. This means that respondents prefer a chatbot with a human appearance to perceive social presence. These results support hypothesis 1a, but reject hypothesis 2a.

4.2.2 Satisfaction

Additionally, table 8 shows that there is a main effect between chatbot appearance and satisfaction, $p = 0.024$ (F = 3.852). A Bonferroni analysis shows that there is again a significant difference between the human chatbot ($M = 4.43$, $SD = 0.82$) and the animated chatbot ($M = 3.92$, $SD = 1.06$), with $F(2, 132) = 3.380$, $p = 0.039$, but there is no significant difference between the human chatbot and the organizational logo ($M = 4.05$, $SD = 0.99$), with $F(2, 132) = 3.380$, $p = 0.139$. Moreover, there is also no significant difference between the animated chatbot and the organizational logo, with $F(2, 132) = 3.380$, $p = 0.823$. These results show that a human chatbot is the most satisfying, compared to the animated or organizational logo chatbot. Consequently, the results support hypothesis 1b, but reject hypothesis 2b.

4.2.3 Purchase intention

Furthermore, the results in table 8 also show that there is also a main effect between purchase intention, $p < 0.001$ (F = 7.772). The Bonferroni analysis shows that there is a significant difference between the human chatbot ($M = 3.41$, $SD = 1.06$) and the animated chatbot ($M =$

2.60, *SD* = 1.04), with $F(2, 132) = 7.179$, $p = 0.002$, and between the human chatbot and the organizational logo ($M = 2.76$, $SD = 1.10$), with $F(2, 132) = 7.179$, $p = 0.014$. However, the Bonferroni analysis shows that there is no significant difference between the animated chatbot and the organizational logo, with $F(2, 132) = 7.179$, $p = 1.000$. These results support hypothesis 1c, but reject hypothesis 2c, which means that respondents were the most likely to buy from the chatbot with a human appearance.

Table 8.

Multivariate test; Test of between-subjects effects

Source	Dependent variable	df	F	p
Chatbot appearance	Social presence	2	3.423	0.036
	Satisfaction	2	3.852	0.024
	Purchase intention	2	7.772	0.001

4.3 Interaction effect of chatbot appearance and task complexity

The interaction effects of chatbot appearance and task complexity on the dependent variables (social presence, satisfaction and purchase intention) were measured using a multivariate analysis of variance (MANOVA). The interaction between the two main effects, chatbot appearance * task complexity showed that there is no significant interaction effect between chatbot appearance and task complexity, with $\Lambda = 0.963$, $F(6, 254) = 0.799$, $p = 0.572$.

Additionally, the results in table 9 show that there is also no interaction effect between chatbot appearance * task complexity and the different dependent variables, with $p > 0.05$; Wilks' $\Lambda = 0.572$. Therefore, hypotheses 3a, 3b and 3c are not supported. The expected interaction effects are rejected.

Table 9.

Multivariate test; Test of between-subjects effects

Source	Dependent variable	df	F	p
Chatbot appearance * Task complexity	Social presence	2	1.680	0.190
	Satisfaction	2	1.986	0.141
	Purchase intention	2	0.494	0.611

4.4 Moderating effect of age

The moderating effect of age of the respondents on the dependent variables was measured using an Univariate analysis of variance (ANOVA). First of all, the moderating effect between the two variables, chatbot appearance * age of the respondents on social presence, showed that there is a significant effect between age of the respondents and social presence, with F (2, 135) = 5.017, p = 0.008. Descriptive statistics show that digital immigrants perceive the highest social presence from the chatbot with the human appearance (M = 3.48, SD = 0.84), while the digital natives perceive the highest social presence from the organizational logo (M = 3.43, SD = 0.73). From here it can be concluded that age moderates the effect of chatbot appearance on social presence and that digital natives perceive higher social presence from the chatbot with the human appearance. These results support hypothesis 4a.

Second, the moderating effect between chatbot appearance * age of the respondents on satisfaction showed that there is no significant effect between age of the respondents and satisfaction, with F (2, 135) = 0.986, p = 0.376. Consequently, hypothesis 4b is rejected.

Last of all, the moderating effect between chatbot appearance * age of the respondents on purchase intention showed that there is also no significant effect between age of the respondents and purchase intention, with F (2, 135) = 0.265, p = 0.768. As a result, hypothesis 4c is rejected.

4.5 Mediation effect of social presence

In order to assess whether there is a positive association between chatbot appearance and the dependent variables, satisfaction (H4a) and purchase intention (H4b), and whether these relationships are mediated by social presence, multiple linear regression analyses based on Preacher and Hayes' (2004) PROCESS macro for SPSS were conducted. The results related to satisfaction are presented in figure 6 and the results related to purchase intention in figure 7.

4.5.1 Satisfaction

First of all, the direct effect of the independent variable chatbot appearance on the dependent variable satisfaction, ignoring the mediator, showed that chatbot appearance is a significant predictor of satisfaction, with b = 0.6528, t(133) 8.37, p < 0.001. Second, the effect of chatbot appearance on the mediator social presence was also found to be significant, with b = 0.6407, t(133) 8.86, p < 0.001. Third, the mediation analysis showed that the effect of the mediator

(social presence), controlling for chatbot appearance, was significant, with b = 0.3919, t(132) 4.29, p < 0.001. Fourth, when controlling for the mediator (social presence), the independent variable chatbot appearance was found to be a significant predictor of satisfaction, with b = 0.4071, t(132) 4.68, p < 0.001. Last of all, the analysis for the indirect effect of chatbot appearance on satisfaction through social presence showed that the effect size is significantly greater than zero and that zero falls not within the bootstrap confidence interval, *effect size:* 0.2609, *95% CI:* [0.1450 , 0.4192]. Therefore, the positive association between chatbot appearance and satisfaction is fully mediated by social presence at α = 0.05. The results support hypothesis 5a.

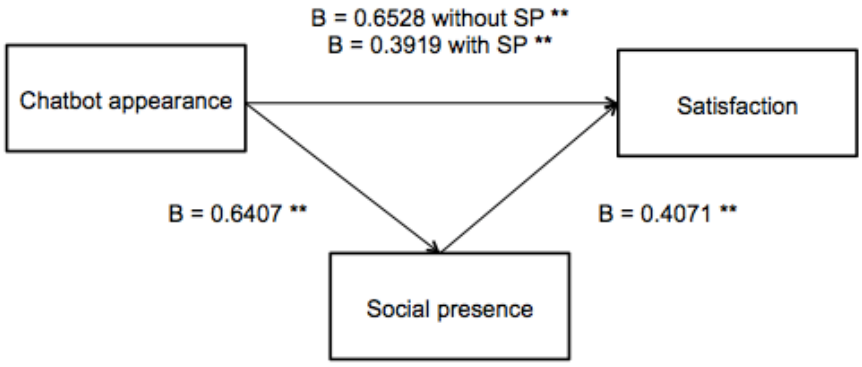


*Figure 6. Mediation model of chatbot appearance as independent variable and satisfaction as dependent variable with social presence as mediator. ** p < 0.001.*

4.5.2 Purchase intention

In order to assess whether there is a positive association between chatbot appearance and purchase intention and whether this relationship is mediated by social presence (H4b), another regression analysis was performed. The results are presented in figure 7.

First of all, the direct effect of the independent variable chatbot appearance on the dependent variable purchase intention, ignoring the mediator, showed that chatbot appearance is a significant predictor of purchase intention, with b = 0.5543, t(133) 5.58, p < 0.001. Second, the effect of chatbot appearance on the mediator social presence was also found to be significant, with b = 0.6407, t(133) 8.86, p < 0.001. Third, the mediation analysis showed that the effect of the mediator (social presence), controlling for chatbot appearance, was significant, with b = 0.4132, t(132) 3.32, p = 0.0011. Fourth, when controlling for the mediator (social presence), the independent variable chatbot appearance was not found to be a significant predictor of purchase intention, with b = 0.2202, t(132) 1.86, p = 0.0645. Lastly, the indirect effect of

chatbot appearance on purchase intention through social presence showed that the effect size is significantly greater than zero and that zero falls not within the bootstrap confidence interval, *effect size:* 0.1411, *95% CI:* [0.0108 , 0.2805]. Therefore, the positive association between chatbot appearance and purchase intention is also fully mediated by social presence at $\alpha = 0.05$. The results support hypothesis 5b.

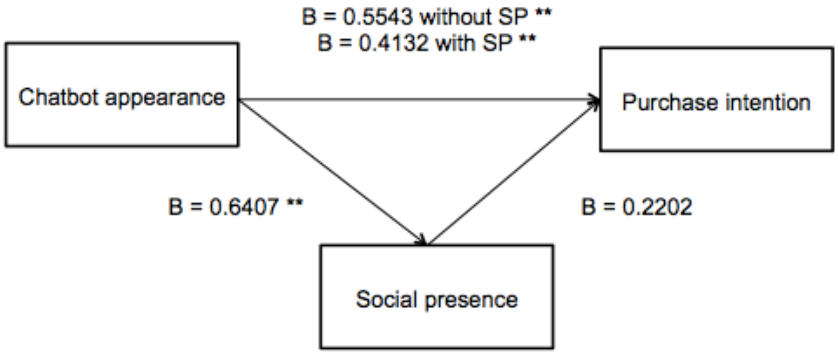


*Figure 7. Mediation model of chatbot appearance as independent variable and purchase intention as dependent variable with social presence as mediator. ** $p < 0.001$.*

4.6 Hypotheses

In this paragraph, an overview of the hypotheses is given in table 12.

Table 12.

Overview of the hypotheses

Hypotheses		Supported
H1a	The perception of social presence is higher when people are confronted with a chatbot using a human picture compared to people using a chatbot with an animated picture or no logo	Yes
H1b	The level of satisfaction is higher when people are confronted with a chatbot using a human picture compared to people using a chatbot with an animated picture or company logo	Yes
H1c	The intention to purchase is higher when people are confronted with a chatbot using a human picture compared to people using a chatbot with an animated picture or company logo	Yes
H2a	The perception of social presence is higher when people are confronted with a chatbot using an animated picture compared to people using a chatbot with a company logo	No
H2b	The level of satisfaction is higher when people are confronted with a chatbot using an animated picture compared to people using a chatbot with a company logo	No
H2c	The intention to purchase is higher when people are confronted with a chatbot using an animated picture compared to people using a chatbot with a company logo	No
H3a	The use of a human chatbot when people are performing a complex task will result in higher levels of social presence than the use of an animated chatbot or the use of a chatbot with only a company logo	No
H3b	The use of a human chatbot when people are performing a complex task will result in higher levels of satisfaction with the chatbot interface than the use of an animated chatbot or the use of a chatbot with only a company logo	No
H3c	The use of a human chatbot when people are performing a complex task will result in higher intention to purchase than the use of an animated chatbot or the use of a chatbot with only a company logo	No
H4a	The use of a human chatbot will result in higher levels of social presence among digital immigrants, compared to digital natives	Yes
H4b	The use of a human chatbot will result in higher levels of social presence among digital immigrants, compared to digital natives	No
H4c	The use of a human chatbot will result in higher purchase intentions among digital immigrants, compared to digital natives	No
H5a	The effects of chatbot appearance on satisfaction is mediated by perceived social presence	Yes
H5b	The effects of chatbot appearance on the intention to purchase is mediated by perceived social presence	Yes

5. Discussion

The aim of this study was to investigate if chatbot appearance had an effect on satisfaction and purchase intention and whether these effects were moderated by task complexity and age of the respondent and mediated by social presence. To research this objective, the following four research questions have been proposed: (1) “What are the effects of chatbot appearance on social presence, satisfaction and purchase intention?”; (2) “What are the effects of chatbot appearance, moderated by task complexity, on social presence, satisfaction and purchase intention?”; (3) “What are the effects of chatbot appearance, moderated by age of the respondents, on social presence, satisfaction and purchase intention?” and (4) “What are the effects of chatbot appearance, mediated by perceived social presence, on satisfaction and purchase intention?”. These questions were answered with a 2x3 experimental design and five main hypotheses.

5.1 Discussion of results

5.1.1 Discussion of main effects

5.1.1.1 Social presence

This research sought to investigate whether a human chatbot appearance yields greater feelings of social presence than an animated or organizational logo chatbot. Based on findings from Qui and Benbasat (2009), it was expected that respondents would perceive higher feelings of social presence when talking to a chatbot with a human appearance, compared to the chatbot with an animated appearance or the organizational logo, as a human-like appearance has been found to exhibit higher levels of social presence (Schuetzler et al., 2014). Results show that the perceived social presence level was the highest with the chatbot with a human appearance. Therefore, hypothesis 1a was accepted.

Moreover, based on the findings from Qui and Benbasat (2009), it was also expected that a chatbot with an animated appearance would yield greater feelings of social presence, compared to a chatbot showing an organizational logo. However, results show that this is not the case. This disagreement with earlier findings could be attributed to the fact that social cues, e.g., a human-like appearance, could have an opposite effect when they irritate users (Louwerse, Graesser, Lu & Mitchell, 2005) or when they too closely resemble human beings (Louwerse et

al., 2005). If appearances have abnormal features, this could cause the characteristic uncanny feeling, which is in line with the research by MacDorman (2006) and Seyema and Nagayama (2007). The "uncanny valley" hypothesis describes that human-like technologies are seen as more agreeable, until they become so human that users find their nonhuman flaws disturbing (Mori, 1970). For this reason, hypothesis 2a was rejected.

5.1.1.2 Satisfaction

It was expected that respondents would be more satisfied when they interacted with a chatbot with a human appearance, compared to the animated or organizational logo chatbot, as a human chatbot was seen as high in social presence. This could be explained with the theory of social presence, as high perceived social presence is a strong predictor of audience satisfaction (Gunawardena & Zittle, 1997; Verhagen, Van Nes, Feldberg, & Van Dolen, 2014). Indeed, in this research it was found that the effect of chatbot appearance on satisfaction was explained by social presence. Results show that the effect of chatbot appearance on satisfaction was the strongest for the chatbot with a human appearance. For these reasons, hypotheses 1b and 4a were confirmed.

Furthermore, based on the findings from Qui and Benbasat (2009), it was expected that respondents would be more satisfied when they have talked to the animated chatbot, compared to the chatbot with the organizational logo. Nevertheless, results show that the chatbot with the organizational logo was perceived as more satisfying than the animated chatbot. This could also be explained with the "uncanny valley" hypothesis (Mori, 1970). So, hypothesis 2b was rejected.

5.1.1.3 Purchase intention

Consistent with the predictions, chatbot appearance was related to higher purchase intentions. Respondents were most likely to buy from the chatbot with a human appearance. This effect could also be explained with the theory of social presence, as researchers have found that higher levels of perceived social presence positively impact the intentions to purchase online (Hassanein & Head, 2005; Cyr, Hassanein, Head, & Ivanov, 2007; Lu, Fan, & Zhou, 2016). Also this research showed that the effect of chatbot appearance on purchase intention was explained by social presence. So, hypotheses 1c and 4b were confirmed.

Moreover, it was expected that the intention to purchase would be higher when respondents were confronted with a chatbot using an animated appearance compared to a chatbot with the organizational logo (Qui and Benbasat, 2009). Though, results show that this was not the case. This disagreement could also be attributed to the "uncanny valley" hypothesis (Mori, 1970). For this reason, hypothesis 2c was rejected.

5.1.2 Discussion of interaction effects

Related to the social presence theory, it was expected that perceived social presence would be low when task complexity was perceived to be high (vs. low) (Xu, 2016), as high task complexity increases consumers' feelings of helplessness (Perrewé & Mizerski, 1987). Therefore, it was expected that respondents would prefer a chatbot with a human appearance when they had to perform a complex task, as a chatbot with a human appearance is perceived as high in social presence (vs. animated or organizational logo chatbot) and high perceived social presence decreases the feeling of helplessness.

However, in this study, there was no interaction effect found between chatbot appearance and task complexity. This could be explained with the low mean score of the complex task (M = 2.34, SD = 1.09), which was measured on a 5-point Likert scale, which means that the complex task was not really seen as a complex task, compared to the simple task (M = 1.74, SD = 0.93).

5.1.3 Discussion of moderation effects

Previous research (Siriaraya & Siang Ang, 2012) showed that digital immigrants reported significantly lower levels of social presence when interacting with a chatbot with a non-avatar appearance (compared to digital natives) in an online environment. Therefore, it was expected that digital immigrants would prefer a chatbot with a human appearance to perceive a higher level of social presence, satisfaction and purchase intention. Indeed, results of this research show that digital immigrants prefer a human chatbot to perceive feelings of social presence. For digital natives the chatbot can display the organizational logo to perceive feelings of social presence. However, there were no significant effects found of the age of respondents on satisfaction and purchase intention.

5.1.4 Discussion of mediation effects

In this study, it was expected that the effect of chatbot appearance on satisfaction was mediated by perceived social presence, as social presence was found as a strong predictor of satisfaction (Gunawardena & Zittle, 1997; Etemad & Sajadi, 2016; Hassanein & Head, 2005; Cyr, Hassanein, Head & Ivanov, 2007; Lu, Fan, & Zhou, 2016). Indeed, results show that the effect of chatbot appearance on satisfaction was mediated by social presence. For this reason, hypothesis 5a was supported.

Additionally, it was expected that the effect of chatbot appearance on purchase intention was mediated by perceived social presence, as high levels of perceived social presence were found to positively impact the intentions to purchase online (Gefen & Straub, 2003; Hassanein & Head, 2005; Cyr, Hassanein, Head, & Ivanov, 2007; Lu, Fan, & Zhou, 2016). Indeed, results show that the effect of chatbot appearance on purchase intention was mediated by social presence. For this reason, hypothesis 5b was supported.

5.2 Implications

5.2.1 Practical implications

This research was conducted with the aim to give designers and organizations helpful implications for the design of chatbots. Results of this study may provide insights and understanding into how to best deploy a visually appealing chatbot. It does not only increase their conceptual knowledge of chatbot appearance, but also reduces effort, time, and cost to design, implement, and maintain such a chatbot (Verhagen, Van Nes, & Feldberg, 2014).

Generally, the results of this study show that it is better to design a chatbot with a human appearance, compared to an animated chatbot, to exhibit higher feelings of social presence, satisfaction and purchase intention. The use of a human chatbot does not result in significant differences to the organizational logo, but mean scores show that the human chatbot scores higher. Therefore, designers and/or organizations should focus on designing a chatbot with a human appearance instead of an animated appearance or the organizational logo to increase feelings of social presence, satisfaction and purchase intention.

Specifically, it appeared that a chatbot with a human appearance had a significant impact on social presence among digital immigrants. Designers and organizations should therefore focus

on designing a chatbot with a human appearance instead of an animated appearance or the organizational logo for digital immigrants to increase feelings of perceived social presence. Digital immigrants seem to perceive lower feelings of social presence in an online environment. If a main goal of designers and/or organizations is to reach digital immigrants, it is recommendable to design a chatbot with a human appearance. If designers and/or organizations want to reach digital natives, it is recommendable to design a chatbot with the organizational logo to exhibit feelings of social presence. If the goal from designers and/or organizations is to satisfy users or increase their purchase intention, it is advisable to design a chatbot with a human appearance, regardless the age of the users.

5.2.2 Theoretical implications

Previous research found that social cues, such as a human-like appearance, positively affects users' perceived social presence (Qiu & Benbasat, 2009). However, no researches were done on the effects of a human appearance in an online shopping environment. This study was the first to take a human chatbot appearance as a factor that influences social presence, satisfaction and purchase intention in an online shopping environment into account. It therefore adds to the field of research about chatbot design and the impact of appearance on social presence, satisfaction and purchase intention. Findings can be used as the foundation to examine the effects of a human chatbot appearance within an online shopping environment using artificial intelligence.

5.3 Limitations and recommendations for further research

This study has a few limitations that can be used as an inspiration for future research. This section discusses the most important limitations and recommendations for future research.

First of all, the use of a non-probability sample of family members and friends of the researcher could have an effect on the research outcomes. This way of data collection made it easy to achieve enough responses, but the validity could be influenced because the respondents may not be a good reflection of the real population. Further research could use a bigger sample to make sure the results are more valid to use.

Second, related to the demographic information from the respondents, only the age group was asked. As such, the actual age, gender and educational level of the respondents was not known.

Because of this, it was impossible to describe the respondents on the basis of demographic information, and so, it was impossible to explain some effects. For example, with the educational level of the respondents, it could be explained why there was no interaction effect between chatbot appearance and task complexity. For instance, when the respondents were all highly educated, it could be that they did not perceive the complex task as really complex. Future research has to obtain demographic information from the respondents.

Third, the chatbot conversation was developed in Facebook Messenger, due to time and costs. Facebook Messenger had limited functionalities (e.g., artificial intelligence) to design and export the chatbot interfaces. Consequently, it was not possible to talk to the chatbot, rather, respondents had to use a menu to interact with the chatbot. Another limitation related to Facebook Messenger was that the chatbot interface could only be exported in Facebook Messenger, so it was a requirement that respondents had a Facebook account to participate in the study. It would be interesting to replicate this study and implement artificial intelligence.

5.4 Conclusion

This study investigated whether chatbot appearance had an effect on satisfaction and purchase intention, and whether this relationship was moderated by task complexity and age of the respondents and mediated by social presence. The most noticeable findings were that the chatbot with a human appearance generally appeared to be the most satisfying and leading to the highest intention to purchase. Also, it appeared that social presence was a mediating factor in these associations. Thus, if designers/organizations want to exhibit feelings of perceived social presence, satisfaction and purchase intention in general, it is recommendable to design a chatbot with a human appearance. However, for digital natives it appeared that the chatbot with the organizational logo exhibits the highest feelings of perceived social presence. Nevertheless, there was no interaction effect found between chatbot appearance and task complexity. This could be explained with the low mean score of the complex task, which means that the task was not really seen as a complex task.

5.5 Acknowledgements

First of all, I want to thank my first supervisor, Dr. Ardion Beldad from University Twente. His expertise, feedback and patience were very meaningful during the completion of this study. Secondly, I would like to thank my second supervisor, Dr. Sjoerd de Vries from University Twente, for his expertise and feedback. Thirdly, I want to thank Kees Smit Tuinmeubelen for this opportunity and advice they have given me throughout the process of conducting this study. Finally, I would like to express my gratitude to marketing agency Adwise for the advice during the development of the chatbots.

References

Amaro, S., & Duarte, P. (2015). The quality of internet-user recall: A comparative analysis by online sales-promotion types. *Journal of Advertising Research, 54*(1), 56-70.

Amdocs. (2017). Consumers want female and funny – but not youthful – chatbots. Retrieved, 28 September, 2018, from: https://www.amdocs.com/media-room/consumers-want-female-and-funny-not-youthful-chatbots

Anderson, R. E., & Srinivasan, S. S., (2003). E-satisfaction and e-loyalty: A contingency framework. *Psychology and Marketing, 20*(2), 123–138.

Appel, J., von der Pütten, A., Krämer, N. C., & Gratch, J. (2012). Does humanity matter? Analyzing the importance of social cues and perceived agency of a computer system for the emergence of social reactions during human-computer interactions. *Advances in Human-Computer Interaction,* 1-10.

Aspect. (2016). 2016 Aspect consumer experience index. Retrieved, 07 May, 2018, from: https://www.aspect.com/globalassets/2016-aspect-consumer-experience-index-survey_index-results-final.pdf

Azjen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*(2), 179-211.

Bartneck, C., Kulic, D., Croft, E., & Zoghbi, S. (2008). Measurement instruments for the anthropomorphism, animacy, likeability, perceived intelligence, and perceived safety of robots. *International Journal Social Robotics, 1,* 71-81.

Berry, L. L. (1999). *Discovering the soul of service.* New York: The Free Press.

Cassel, J., Suvillian, J., Prevost, S., & Churchill, E. (2000). *Embodied conversational agents.* Cambridge, MA: MIT Press.

Cyr, D., Hassanein, K., Head, M., & Ivanov, A. (2007). The role of social presence in establishing loyalty in e-Service environments. *Interacting with computers, 19,* 43-56.

Daft, R. L., & Lengel, R. H. (1984). *Information richness: A new approach to managerial behavior and organizational design.* Greenwich, CT: JAI Press.

Daft, R. L., Sormunen, J., & Parks, D. (1988). Chief executive scanning, environmental characteristics, and company performance: An empirical study. *Strategic Management Journal, 9,* 123-139.

Felnhofer, A., Kothgassner, O. D., Hauk, N., Beutl, L., Hlavacs, H. & Kryspin-Exner, I. Physical and social presence in collaborative virtual environments: Exploring age and gender differences with respect to empathy. *Computers in Human Behavior, 31,* 272-279.

Fogg, B. J. (2002). Computers as persuasive social actors. *Persuasive Technology: Using Computers to Change What We Think and Do,* San Fransisco, CA, USA: Morgan Kaufmann Publishers, 89-120.

Furini, M. (2013). Users behavior in location-aware services: Digital natives versus digital immigrants. *Advances in Human-Computer Interaction.*

Gartner. (2018). Gartner says 25 percent of customer service operations will use virtual customer assistants by 2020. Retrieved, December 31, 2018, from: https://www.gartner.com/en/newsroom/press-releases/2018-02-19-gartner-says-25-percent-of-customer-service-operations-will-use-virtual-customer-assistants-by-2020

Gefen, D., & Straub, D. W. (2003). Managing user trust in B2C e-services. *e-Service Journal, 2*(2), 7–24.

Gefen, D., & Straub, D. W. (2004). Consumer trust in B2C e-commerce and the importance of social presence: experiments in e-products and e-services. *Omega, 32,* 407-424.

Gnewuch, U., Adam, M. T. P., Morana, S., & Maedche, A. (2018). The chatbot is typing… The role of typing indicators in human-chatbot interaction. *Proceedings of the 17th Annual Pre-ICIS Workshop on HCI Research, San Fransisco, USA*

Goertzel, B. (2018). Sophia. Retrieved, 29 September, 2018, from: http://www.hansonrobotics.com/robot/sophia/

Grewal, D., Monroe, K. B., & Krishnan, R. (1998). The effects of price-comparison advertising on buyers' perceptions of acquisition value, transaction value, and behavioral intentions. *Journal of Marketing, 62,* 46–59.

Gunawardena, C. N., & Zittle, F. J. (1997). Social presence as a predictor of satisfaction within a computer mediated conferencing environment. *American Journal of Distance Education, 11*(3), 8-26.

Harris, H., Bailenson, J. N., Nielsen, A., & Yee, N. (2009). The evolution of social behavior over time in second life. *Presence: Teleoperators and Virtual Environments, 18*(6), 434–448.

Hassanein, K., & Head, M. (2007). Manipulating perceived social presence through the web interface and its impact on attitude towards online shopping. *International Journal of Human-Computer Studies, 65,* 689-708.

Hervouët, J. (2017). Can human and artificial intelligence be combined? Retrieved, 08 May, 2018, from: https://www.iadvize.com/blog/en/can-human-and-artificial-intelligence-be-combined/

Hunt, H. K. (1977). *Conceptualization and measurement of consumer satisfaction and dissatisfaction.* Cambridge, MA: Marketing Science Institute.

Kamis, A., Koufaris, M., & Stern, T. (2008). Using an attribute-based decision support system for user-customized products online: An experimental investigation. *MIS Quarterly, 32*(1), 159-177.

Kehrwald, B. (2008). Understanding social presence in text-based online learning environments. *Distance Education, 29*(1), 89-106.

Khmelnitskaya, D. (2018). 6 Best AI chatbots to improve your customer service. Retrieved, 15 May, 2018, from: https://www.livechatinc.com/blog/chatbots-improve-customer-service/

Kim, Y. K. (2002). Consumer value: An application to mall and Internet shopping. *International Journal of Retail & Distribution Management, 30*(12), 595-602.

Lariviére, B., Bowen, D., Andreassen, T. W., Kunz, W., Sirianni, N. J., & Voss, C. (2017). "Service encounter 2.0": An investigation into the roles of technology, employees and customers. *Journal of Business Research, 79,* 238-246.

Lee, K. M., Jung, Y., Kim, J., & Kim, S. R. (2006). Are physically embodied social agents better than disembodied social agents?: The effects of physical embodiment, tactile interaction, and people's loneliness in human-robot interaction. *International Journal of Human-Computer Studies, 64,* 962-973.

Lim, J. S., Hwang, Y. C., Kim, S., & Biocca, F. A. (2015). How social media engagement leads to sports channel loyalty: Mediating roles of social presence and channel commitment. *Computers in Human Behavior, 46,* 158-167.

Lombard, M., & Ditton, T. (1997). At the heart of it all: The concept of presence. *Journal of Computer Mediated Communication, 9*(3:2).

Louwerse, M. M., Graesser, A. C., Lu, S., & Mitchell, H. H. (2005). Social cues in animated conversational agents. *Applied Cognitive Psychology, 16*(6), 1-12.

Lu, B., Fan, W., & Zhou, M. (2016). Social presence, trust, and social commerce purchase intention: An empirical research. *Computers in Human Behavior, 56,* 225e237.

MacDorman, K. F. (2006). Subjective ratings of robot video clips for human likeness, familiarity, and eeriness: An exploration of the uncanny valley. *Cognition, 146,* 190-205.

McQuitty, S., Finn, A., & Wiley, J. B. (2000). Systematically varying consumer satisfaction and its implementations for product choice. *Academy of Marketing Science Review.* Retrieved, 25 January, 2019, from: http://www.amsreview.org/articles/mcquity10-2000.pdf

McTear, M. F. (2017). The rise of the conversational interface: A new kid on the block? *Future and Emerging Trends in Language Technology. Machine Learning and Big Data. FETLT 2016,* pp. 38-49.

Meuter, M. L., Ostrom, A., Roundtree, R., & Bitner, M. J. (2000). Self-service technologies: Understanding customer satisfaction with technology-based service encounters. *Journal of Marketing, 64*(7), 50-64.

Mori, M. (1970). The uncanny valley. *Energy, 7*(4), 33-35.

Morwitz, V. G., Steckel, J. H., & Gupta, A. (2007). When do purchase intentions predict sales? *International Journal of Forecasting, 23*, 347-364.

Nass, C., & Moon, Y. (2000). Machines and mindlessness: Social responses to computers. *Journal of Social Issues, 56*(1), 81-103.

Nass, C., Steuer, J., & Tauber, E. R. (1994). Computers are social actors. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, Boston, MA, USA, pp. 72-78.

Norman, D. (1986). Cognitive engineering. User-centered System Design: New Perspectives on Human-Computer Interaction, Lawrence Erlbaum, Hilssdale, New Jersey.

Oliver, R. L. (1980). A cognitive model of the antecedents and consequences of satisfaction decisions. *Journal of Marketing Research, 17*(4), 460–469.

Payne, J. W. (1982). Contingent decision behavior. *Psychological Bulletin,* 382-402.

Payne, J. W., Bettman, J. R., & Johnson, E. (1988). Adaptive strategy selection in decision making. *Journal of Experimental Psychology, 14*(3), 534-552.

Perrewé, P. L., Mizerski, R. W. (1987). Locus of control and task complexity in perceptions of job dimensions. *Psychology Reports, 61*(1), 43-49.

Preacher, K. J., & Hayes, A. F. (2004). SPSS and SAS procedures for estimating indirect effects in multiple mediator models. *Behavior Research Methods, Instruments, and Computers, 37,* 717-731.

Qiu, L., & Benbasat, I. (2009). Evaluating anthropomorphic product recommendation agents: A social relationship perspective to designing information systems. *Journal of Management Information Systems, 25*(4), 145-182.

Radziwill, N., Benton, M. (2017). Evaluating quality of chatbots and intelligent conversational agents. Retrieved, 29 May, 2018, from: https://arxiv.org/pdf/1704.04579.pdf

Rangarajan, D., Jones, E., & Chin, W. (2005). Impact of sales force automation on technology-related stress, effort, and technology usage among salespeople. *Industrial Marketing Management, 34*(4), 345-354.

Rice, R. E., Hughes, G., & Love, G. (1989). Usage and outcomes of electronic messaging at a R&D organization: Situational constraints, job level, and media awareness. *Office, Technology and People, 5*(2), 141–61.

Richardson, J., & Swan, K. (2003). Examining social presence in online courses in relation to students' perceived learning and satisfaction. *Journal of Asynchronous Learning Networks, 7*(1), 68-88.

Riegelsberger, J., Sasse, M. A., & McCarthy, J. D. (2003). Shiny happy people building trust? Photos on e-commerce websites and consumer trust. CHI2003, Ft. Lauderdale, FL, USA.

Schuetzler, R. M., Grimes, G. M., Giboney, J. S., & Buckman, J. (2014). Facilitating natural conversational interactions: Lessons from a deception experiment. *Proceedings of the 35th International Conference on Information Systems,* Auckland, NZ, pp. 1-16.

Seyema, J., & Nagayama, R. S. (2007). The uncanny valley: Effect of realism on the impression of artificial human faces. *Technology, 16*(4), 337-351.

Short, J., Williams, E., & Christie, B. (1976). *The social psychology of telecommunications.* London: Wiley.

Simonite, T. (2017). Facebook's perfect, impossible chatbot. *MIT Technology Review.* Retrieved, 31 December, 2018, from: https://www.technologyreview.com/s/604117/facebooks-perfect-impossible-chatbot/

Singh, N. (2017). Why consumers want your chatbot to be more human? Retrieved, 25 September, 2018, from: https://www.entrepreneur.com/article/300412

Siriaraya, P., & Siang Ang, C. (2012). Age differences in the perception of social presence in the use of 3D virtual world for social interaction. *Interacting with Computers, 24*(4), 280-291.

Speier, C., Morris, M. G. (2003). The influence of query interface design on decision-making performance, *MIS Quarterly, 27*(3), 397-423.

Steinfield, C. W. (1986). Computer-mediated communication in an organizational setting: Explaining task-related and socioemotional uses. *Communication Yearbook.* Newbury Park, CA: Sage.

Straub, D. W., & Karahanna, E. (1998). Knowledge worker communications and recipient availability: Toward a task closure explanation of media choice. *Organization Science, 9*(2), 160–75.

Taylor, T. (2002). Living digitally: Embodiement in virtual worlds. The social live of avatars: Presence and interaction in shared virtual environments. London: Springer-Verlag.

Tiamiyu, M. A. (1992). The relationships between source use and work complexity, decision-maker discretion and activity duration in Nigerian government ministries. *International Journal of Information Management, 12,* 130-141.

Tsiotsou, R. (2006). The role of perceived product quality and overall satisfaction on purchase intentions. *International Journal of Consumer Studies, 30*(2), 207-217.

Tu, C. H., & McIsaac, M. (2002). The relationship of social presence and interaction in online classes. *The American Journal of Distance Education, 16*(3), 131-150.

Urbi, J. (2018). The complicated truth about Sophia – an almost human robot or a PR stunt? Retrieved, 29 September, 2018, from: https://www.cnbc.com/2018/06/05/hanson-robotics-sophia-the-robot-pr-stunt-artificial-intelligence.html

Verhagen, T., Van Nes, J., Feldberg, F., & Van Dolen, W. (2014). Virtual customer service agents: Using social presence and personalization to shape online service encounters. *Journal of Computer-Mediated Communication, 19*, 529-545.

Wakefield, R. L., Wakefield, K. L., Baker, J., & Wang, L. C. (2011). How website socialness leads to website use. *European Journal of Information Systems, 20*(1), 118-132.

Xu, J. (2016). Retaining customers by utilizing technology-facilitated chat: Mitigating website anxiety and task complexity. *Information & Management, 53*(5), 554–569.

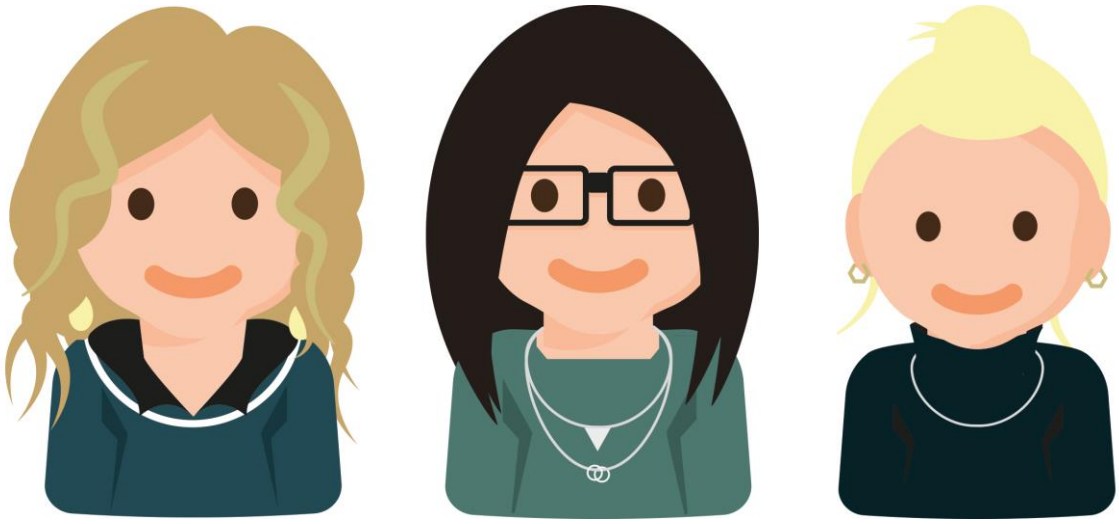
Zeithaml, V. A., Berry, L. L., & Parasuraman, A. (1996). The behavioral consequences of service quality. *Journal of Marketing, 60*, 31-46.

Zmud, R. O., Lind, M., & Young, F. (1990). An attribute space for organizational communication channels. *Information Systems Research, 1*(4), 440–57.

Appendices

Appendix 1 – Human condition

Appendix 2 – Animated condition



Appendix 3 – Constructs of the pre-test – chatbot appearance

3.1 Anthropomorphism

Anthropomorphism refers to the attribution of a human-form, human characteristics, or human behavior to nonhuman things such as robots, computers, and animals.

Please rate your impression of the robot on these scales:

Fake (nep)	1	2	3	4	5	Natural (natuurlijk)
Machinelike (robotachtig)	1	2	3	4	5	Humanlike (menselijk)
Artificial (kunstmatig)	1	2	3	4	5	Lifelike (levensecht)

3.2 Animacy

Animacy is about the classic perception of life (make robots lifelike).

Please rate your impression of the robot on these scales:

Dead (doods)	1	2	3	4	5	Alive (levend)
Stagnant (statisch)	1	2	3	4	5	Lively (opgewekt)
Mechanical (mechanisch)	1	2	3	4	5	Organic (organisch)
Inert (energieloos)	1	2	3	4	5	Interactive (interactief)

Additional questions for the manipulation check

How would you describe the image in the chatbot interface?

The chatbot interface presents a picture of a real person	Yes/No
The chatbot interface presents a picture of an animated person	Yes/No

Appendix 4 – Constructs of the pre-test – task complexity

4.1 Task complexity

The task I am doing with the chatbot is complex.

Disagree 1 2 3 4 5 Agree

This task that I am doing with the chatbot requires a lot of thought and problem-solving.

Disagree 1 2 3 4 5 Agree

The task that I am doing with the chatbot is mentally demanding.

Disagree 1 2 3 4 5 Agree

The task that I am doing with the chatbot is challenging.

Disagree 1 2 3 4 5 Agree

Appendix 5 – Outcome of pre-test chatbot appearance

Hekel hebben – leuk vinden

Chatbot number	N	Mean	Std. Deviation
1. Carolien	9	2,67	0,707
2. Sabine	9	2,44	0,882
3. Meike	9	3,56	1,236

Onaangenaam – aangenaam

Chatbot number	N	Mean	Std. Deviation
1. Carolien	9	3,56	1,130
2. Sabine	9	3,00	0,866
3. Meike	9	3,67	1,225

Onvriendelijk – vriendelijk

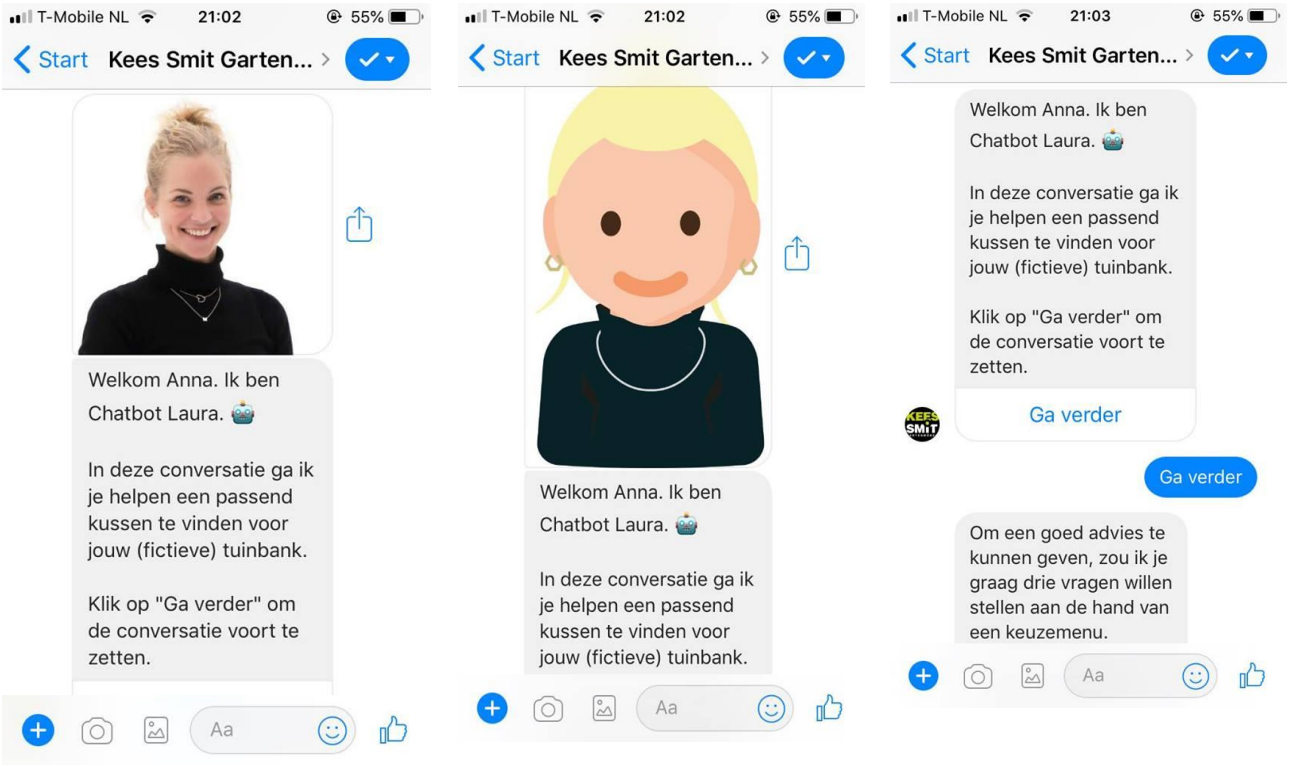
Chatbot number	N	Mean	Std. Deviation
1. Carolien	9	3,78	0,972
2. Sabine	9	3,44	0,726
3. Meike	9	3,89	0,928

Verschrikkelijk – leuk

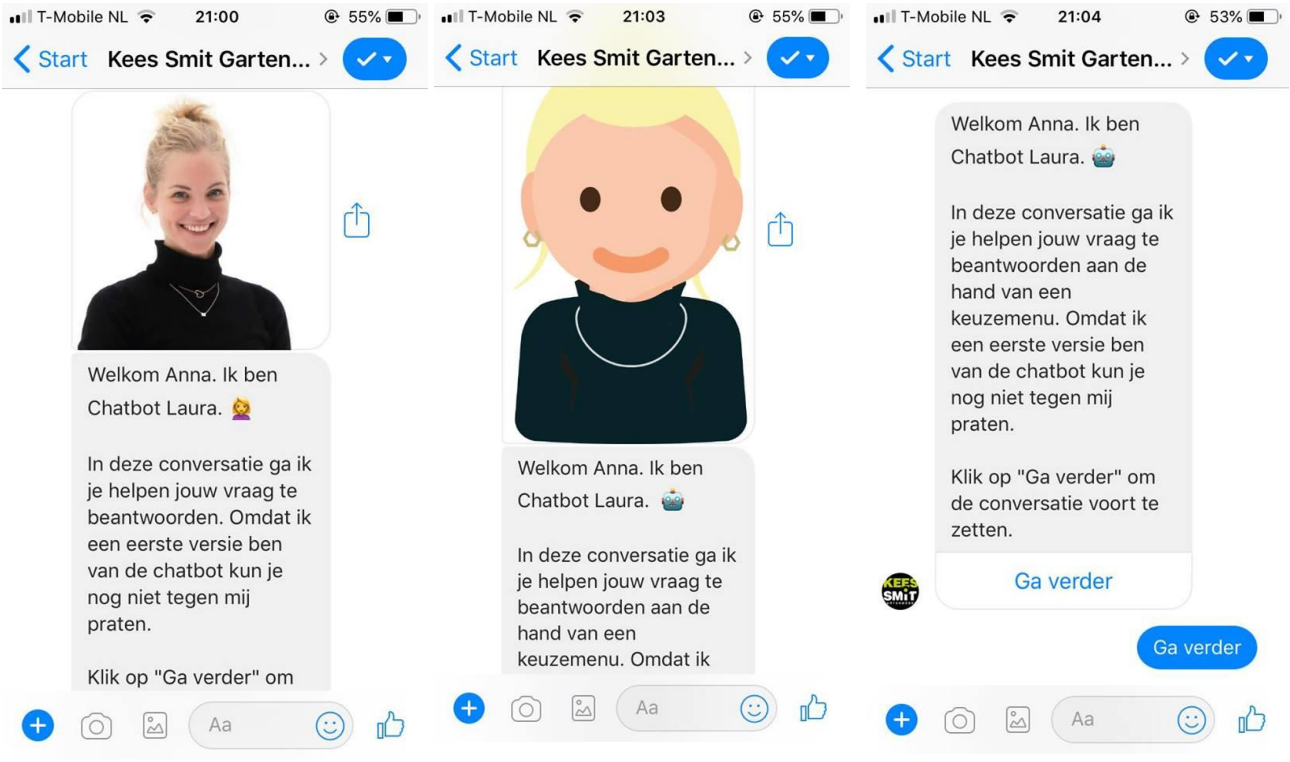
Chatbot number	N	Mean	Std. Deviation
1. Carolien	9	3,33	0,866
2. Sabine	9	3,22	0,441
3. Meike	9	3,78	1,093

Appendix 6 – Chatbot interfaces

1. Human, Animated and Organizational logo – Complex



2. Human, Animated and Organizational logo – Simple



Appendix 7 – Questionnaire main study

1. Inleidende tekst

In het kader van mijn afstudeerscriptie van de Masteropleiding Marketing Communicatie onderzoek ik de eigenschappen van een chatbot. Een chatbot is een online geautomatiseerde gesprekspartner en de klantenservice van Bol en NS maken hier al gebruik van.

In samenwerking met Kees Smit Tuinmeubelen heb ik een chatbot ontwikkeld om te onderzoeken aan welke eigenschappen deze chatbot moet voldoen. Ik ben erg benieuwd wat jij van deze chatbot vindt. Daarom wil ik je graag vragen om mee te werken aan mijn onderzoek.

Het onderzoek neemt ongeveer 5 minuten van jouw tijd in beslag. Er wordt betrouwbaar met jouw gegevens omgegaan en de resultaten worden geheel anoniem verwerkt.

Willen jullie mij helpen met mijn onderzoek en bijdragen aan de verdere ontwikkeling van een chatbot? Klik dan op onderstaande link en je wordt doorgestuurd naar het onderzoek:

* LINK *

Heel erg bedankt voor jouw deelname.

* CHATBOT INTERFACE *

2. Questionnaire

Bij het volgende onderdeel krijg je een aantal vragen en tegenstellingen te zien die je moet beantwoorden. Deze vragen gaan voornamelijk over de eigenschappen van een chatbot.

De chatbot liet een foto van een mens zien
Ja / Nee

De chatbot liet een foto van een avatar zien
Ja / Nee

Hoe beoordeel je de uitstraling van de chatbot?

Nep	1	2	3	4	5	Natuurlijk
Robotachtig	1	2	3	4	5	Menselijk
Kunstmatig	1	2	3	4	5	Levensecht
Doods	1	2	3	4	5	Levend
Statisch	1	2	3	4	5	Opgewekt
Mechanisch	1	2	3	4	5	Organisch
Energieloos	1	2	3	4	5	Interactief

De opdracht die de chatbot moest uitvoeren…

Vond ik complex

Oneens	1	2	3	4	5	Eens

Vond ik uitdagend

Oneens	1	2	3	4	5	Eens

Vereist mentaal veel

Oneens	1	2	3	4	5	Eens

Benodigd veel denk- en oplossingsgericht vermogen

Oneens	1	2	3	4	5	Eens

In hoeverre ben je het eens met onderstaande stellingen?

Ik ben tevreden met de chatbot conversatie

Oneens	1	2	3	4	5	Eens

Mijn keuze om de chatbot een vraag te stellen was een goede keuze

Oneens	1	2	3	4	5	Eens

Ik ben tevreden met de manier waarop de chatbot mij geholpen heeft

Oneens	1	2	3	4	5	Eens

Naar aanleiding van de conversatie met de chatbot…

Is het heel waarschijnlijk dat ik binnenkort een product van Kees Smit koop

Onwaarschijnlijk	1	2	3	4	5	Waarschijnlijk

Overweeg ik om binnen 3 maanden een product bij Kees Smit te kopen

Onwaarschijnlijk	1	2	3	4	5	Waarschijnlijk

Overweeg ik om binnen 6 maanden een product van Kees Smit te kopen

Onwaarschijnlijk	1	2	3	4	5	Waarschijnlijk

Hoe beoordeel je de chatbot?

Niet sociaal	1	2	3	4	5	Sociaal
Robotachtig	1	2	3	4	5	Menselijk
Ongevoelig	1	2	3	4	5	Gevoelig

Tijdens de conversatie met de chatbot…

Had ik het gevoel dat ik met een intelligent wezen communiceerde

Oneens	1	2	3	4	5	Eens

Had ik het gevoel dat ik met een sociaal wezen communiceerde

Oneens	1	2	3	4	5	Eens

Had ik het gevoel dat de chatbot echt met me praatte

Oneens	1	2	3	4	5	Eens

Tot welke leeftijdscategorie behoor je?

18 – 29 jaar

30 – 70 jaar

Bedankt voor jouw deelname. Jouw mening wordt erg op prijs gesteld.

Appendix 8 – Measures main study

8.1 Satisfaction with the chatbot interface

I am satisfied with the chatbot interface.

Disagree	1	2	3	4	5	Agree

My choice to ask the chatbot a question was a wise one.

Disagree	1	2	3	4	5	Agree

I am satisfied with the way the chatbot helped me.

Disagree	1	2	3	4	5	Agree

8.2 Purchase intention

I am very likely to buy a product from Kees Smit Tuinmeubelen.

Unlikely	1	2	3	4	5	Likely

I intend to buy a product within 3 months from Kees Smit Tuinmeubelen.

Unlikely	1	2	3	4	5	Likely

I intend to buy a product within 6 months from Kees Smit Tuinmeubelen.

Unlikely	1	2	3	4	5	Likely

8.3 Social presence

Unsociable	1	2	3	4	5	Sociable
Machinelike	1	2	3	4	5	Life-like
Insensitive	1	2	3	4	5	Sensitive

I feel like the chatbot I interacted with is an intelligent being.

Disagree	1	2	3	4	5	Agree

I feel like the chatbot I interacted with is a social being.

Disagree	1	2	3	4	5	Agree

I feel like the chatbot was really communicating with me.

Disagree 1 2 3 4 5 Agree