

VOICE SHOPPING:  
THE EFFECT OF THE CONSUMER-VOICE ASSISTANT PARASOCIAL  
RELATIONSHIP ON THE CONSUMER'S PERCEPTION AND DECISION MAKING

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## ABSTRACT

The primary goal of this study was to investigate how shopping with voice assistants may be uniquely different from shopping on websites. This study focused on whether using different shopping mediums (i.e., voice assistant and websites) affects the way consumers evaluate the recommended product offered by the shopping medium. Based on the anthropomorphism literature and the parasocial interaction theory, the study proposed consumers to form a stronger parasocial relationship with a more humanlike shopping medium, which in turn influences consumers to evaluate the recommended product more positively. Specifically, consumers were expected to perceive voice assistants as more humanlike than websites because of the way voice assistants are designed (i.e., vocal conversation). Furthermore, the study aimed to understand the effect of two moderators, interaction style (task-oriented interaction vs. socially-oriented interaction) and product type (search product vs. experience product).

To investigate the following questions, two experimental studies were conducted. Both studies recruited participants who are 18-36 years old and are familiar using voice assistants. Study 1 (N=85) utilized a 2 (shopping medium type: voice assistant vs. website) x 2 (interaction style: task-oriented vs. socially oriented) between-subject experiment factorial design. Participants were invited to the lab to interact with Amazon Echo or the Amazon website. Their interaction styles were manipulated using instructions that are focused on either socially-oriented interaction or task-oriented interaction. Study 2 (N=418) utilized a 2 (shopping medium type: voice assistant vs. website) x 2 (product type: experience product vs. search product) between-subject online experiment factorial

design. Study 2 participants were recruited via Amazon MTurk. In Study 2, a hypothetical retailer was created instead of using currently available voice assistants and websites to eliminate the effect of preexisting relationships on the results. The recommended products were manipulated by two products with different search qualities and experience qualities.

In both studies, the results of MANCOVA/MANOVA and PROCESS mediation analyses revealed that consumers evaluated products more positively when they were recommended by the shopping medium they formed a stronger parasocial relationship with. Consumers developed a stronger parasocial relationship with the shopping medium they perceived to be more humanlike. However, unlike hypothesized expectations, consumers perceived websites to be more humanlike than voice assistants, consecutively formed a stronger parasocial relationship with websites and evaluated products recommended by the websites more positively. The moderating effect of interaction style was not statistically significant, but the moderating effect of product type was statistically significant. Participants in the website condition evaluated the recommended experience product significantly more positively than participants in the voice assistant condition. Their evaluation of the recommended search product did not vary significantly between the website condition and the voice assistant condition.

The findings suggest people may perceive voice assistants as an autonomous agent apart from their operating brands while perceiving websites to be inseparable from their operating brands (e.g., employee, product, CEO). In addition, although the proposed hypotheses were not supported, the findings still support the proposed model that suggested consumers be persuaded more by the more humanlike shopping medium

because they form a stronger parasocial relationship with it. Further, the findings also suggest a recommended product's search or experience qualities may critically influence the way consumers evaluate it.

The research contributes to the anthropomorphism literature and parasocial interaction theory by confirming the causal relationship between humanlikeness and parasocial relationships. Further, the research provides knowledge related to utilizing voice assistants in the field of consumer behavior.

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# CHAPTER 1

## INTRODUCTION

The first chapter begins with a general background in voice shopping and a voice assistant. The following sections address the research objectives and the significance of the research.

### 1.1. Background

One morning, a mother of a six-year-old in Dallas was baffled to find a KidKraft Sparkle Mansion Dollhouse and a four-pound tin of sugar cookies delivered to their home. It turned out that her daughter placed the order. The order went through while she was playing dolls with Alexa, a voice assistant from Amazon, also known as Amazon Echo. When she chatted with Alexa about how much she wanted a dollhouse and cookies, Alexa casually asked if she wanted them. Of course, her answer was “Yes!”

This incident had a happy ending. Instead of returning these unexpected items, the family enjoyed the cookies and donated the dollhouse to a local children’s hospital (Williams, 2017). And this meant profit for Amazon because Alexa had made sales. Nevertheless, this darling story also reveals an alarming nature of this new shopping method. When you use a device like Amazon Echo to shop, there is no need to log on to the computer or type in account information to place orders. The whole process can be completed by simply asking the device to do it or saying yes to the device’s suggestion.

These devices are called in various names such as voice-activated intelligent assistants (Jiang et al., 2015), voice-activated personal assistance (Easwara Moorthy & Vu, 2014), smart speakers (Koo, Kim, & Nam, 2017), and conversational agents (Lee &

Choi, 2017). This study uses the term voice assistants to refer to these devices and highlight their functions and communication mode.

Two primary features shape the unique characteristics of voice assistants: 1) spoken interaction and 2) artificial intelligence (Canbek, Mutlu, & Mutlu, 2016). Voice assistants can recognize the user's verbal commands and respond instantly because they are equipped with a speech-recognition system. The speech-recognition system enables voice assistants to quickly respond to their users verbally while eliminating the need for manual operation (Lee, 1989). Artificial intelligence (AI) is the technology that enables machines to perform activities that require human intelligence (Kurzweil, 1990), and it aims to make machines act like a human (Russell & Norvig, 2010). AI allows voice assistants to learn and understand users' needs and give the most relevant answers to a given situation (Russell & Norvig, 2010).

Voice assistants can mimic human-to-human interactions when they interact with the users. When people communicate with each other, they often initiate the conversation by calling out the partner's name (Sacks & Schegloff, 1979). Then, people provide feedback based on previous interpersonal history and the type of relationship they have had with the conversation partner (Berger & Calabrese, 1975). For example, if you know a friend who has and loves a dog, you will ask about how the dog is doing, instead of asking whether the friend likes dogs. Similarly, a user initiates the conversation with a voice assistant by calling out its name. The voice assistant recognizes and responds to its name. The voice assistant's AI recognizes the user's request and analyzes relevant information such as facts from the web and previous interactions with the user. Then, the voice assistant generates the most appropriate response to the user's request. For

example, when a user asks for toilet paper options, a voice assistant will first ask if the user wants to reorder what was previously purchased.

This humanlike interaction of voice assistants makes an important departure from any other user-device interaction such as using a computer or mobile phone. When using typical personal devices such as a PC or mobile phones, users operate the devices (e.g., by typing messages, entering search words), engaging in one-directional interactions. The devices respond to the user's inquiry by displaying texts and images, and multiple results are concurrently displayed (e.g., search engine findings). On the other hand, users of voice assistants engage in two-way interactions (e.g., by having a conversation). Responses to the user's inquiry are verbally presented one at a time.

This different type of interaction with voice assistants is likely to impact how people perceive, evaluate, and judge information. One significant implication is that users may perceive the device as a humanlike partner rather than a tool to use. Because the interaction resembles human-to-human interactions, the users are likely to form a pseudo-social relationship with voice assistants as they interact with the device. Research demonstrated that people can easily experience imagined social interactions and form pseudo-social relationships with various living (e.g., celebrities) (Horton & Wohl, 1956; Rubin et al, 1985) and non-living partners (e.g., brands, avatars) (Hartmann, 2008; Lee, Park, & Song, 2005) when they can perceive them as social actors.

Furthermore, the social relationships formed with devices can bring out typical social responses from the users. Research on social robots suggests that people can engage in social interactions and form relationships with artificial agents. Researchers have found that interaction with social robots reduces people's loneliness, agitation, and

depression (Broadbent, 2017; Robinson, MacDonald, & Broadbent, 2014; Robinson, MacDonald, Kerse, & Broadbent, 2013), thereby suggesting the possibility of using artificial agents to compensate for interpersonal relationships.

The possible social aspect of voice assistants provides a significant implication in the retail context. Will consumers be influenced by retailers' suggestions more when they use voice assistants than when they use other devices? Do consumers perceive voice assistants as more of a social interaction partner than a tool? Will the influence of voice assistants be larger or smaller depending on what product is recommended? It is timely to investigate this possible impact of using voice assistants on consumers and to understand an underlying mechanism of the impact as the device is gaining popularity among consumers.

## **1.2. Problem Statement**

Voice assistants are gaining popularity among consumers despite its short history. Consumers are adopting voice assistants eagerly. It is estimated that 39 million U.S. adults own a voice assistant and the adoption rate of voice assistants so far is faster than that of other devices such as smartphones and tablets (Browne, 2018). According to a recent survey of 1,000 U.S. consumers (PwC, 2018), 90% of the U.S. consumers were familiar with voice-enabled devices, and the majority (72%) of this 90% had some experience of using a voice assistant.

From the perspective of retailers, consumer survey data promise a very positive future for shopping using voice assistants, the shopping style referred to as "voice shopping." Consumers have exhibited few concerns for shopping with voice assistants.

According to a recent survey of 2,012 U.S. consumers (Worldpay, 2017), nearly half of the respondents said that they were comfortable having a voice assistant order items on their behalf, and 37% of the respondents had no concern with giving a voice assistant access to payment information. Another survey (PwC, 2018) revealed that nearly 50% of 1,000 consumers had already made a purchase using voice assistants in the past year and that 33% of consumers were planning to make a purchase in the following year.

Despite the growing use of voice shopping and voice assistants, our understanding of how this new device and shopping method may affect consumers is very limited. Existing market trend reports (e.g., PwC, 2018; Worldplay, 2017) provide a snapshot of the market but do not tell us how a voice assistant's new role as a shopping assistant may affect consumers' judgments and behaviors. The extensive body of consumer research on the impact of shopping with technology — such as internet on personal computers (e.g., Kim, Kim, & Lennon, 2009; Levin, Levin, & Weller, 2005), mobile/tablet devices (e.g., Shen, Zhang, & Krishna, 2016; Yang & Forney, 2013), virtual reality (e.g., Guo & Barnes, 2011; Jin, 2009), and augmented reality (Dacko, 2017; Olsson, Lagerstam, Kärkkäinen, & Väänänen-Vainio-Mattila, 2013) — cannot explain the unique nature of shopping with voice assistants.

Considering the growth of voice assistant usage and its application in shopping, it is timely to investigate this topic. Considering that voice assistants can 1) respond to questions in an intelligent way, and 2) perform the same job as websites through voice interaction, a new approach is needed to understand the voice assistant's role as a shopping assistant. Voice assistants can become a personal shopping advisor to influence



consumers' judgments and decisions in a way that no other traditional online shopping tools were capable of.

Theoretically, it is important to understand the underlying mechanism and develop a theoretical model to further our knowledge and promote future research in this topic. This study aims to propose a theoretical model from the perspective of social interaction to shed light on the potential impact of using voice assistants as a shopping advisor in shopping. Practically, both consumers and retailers should be aware of the different nature of shopping with the voice assistants. For retailers, it is necessary to understand the potential impact voice assistants on consumers to maximize the profit of utilizing voice assistants. For consumers, understanding the nature of voice shopping will enable them to enjoy the benefit of voice shopping while avoiding pitfalls.

### **1.3. Purpose of the Study**

The purpose of this study is to develop and test a theoretical model to explain the unique characteristics of voice shopping and their impact on consumers' evaluation. To test the causal effect of voice shopping attributes, voice shopping was compared with traditional online shopping (using websites). Based on the anthropomorphism literature and parasocial interaction theory, a model was built to predict whether consumers evaluate recommended products differently depending on what shopping mediums they were using. Specifically, the model tests whether consumers evaluate products recommended by a voice assistant more positively than those recommended by a website because consumers perceive a voice assistant as a more humanlike agent and form a closer pseudo-social relationship with it. Two moderators, interaction style and product

type, were examined to explain when the voice assistants' influence on consumers' evaluation becomes stronger or weaker. Two experiments were conducted to answer these questions. Specific research questions are as follows:

- 1) How does shopping with a voice assistant uniquely differ from online shopping using a website?
- 2) Will consumers be more persuaded when a voice assistant recommends a product than when a website recommends a product?
- 3) When will the persuasiveness of the voice assistants be stronger or weaker?
  - a. Will the way consumers interact with a voice assistant moderate the effect?
  - b. Will the product type moderate the effect?

#### **1.4. Significance of the Study**

This study aims to make important theoretical implications. First, the current study begins an initial investigation into the social impact of a voice assistant on consumers' decision-making processes. Current literature on voice assistants is very exploratory in its nature and is often limited to the description of usage patterns (Easwara Moorthy & Vu, 2014; Purington, Taft, Sannon, Bazarova, & Taylor, 2017). Therefore, these studies cannot predict consumer behaviors using voice assistants for shopping. This study will be one of the first to explain voice assistant and voice shopping by developing a theoretical framework based on consumer behavior theories.

Second, this study contributes to the voice assistant literature by extending the scope to retailing, particularly in the area of social influence in shopping. Built on the

parasocial interaction theory (Horton & Wohl, 1956), the current study theorizes that users build pseudo-social relationships with voice assistants because they are perceived as humanlike agents, and that this relationship creates a distinctive outcome in shopping. Previous studies have only tested how users form parasocial relationship with the non-human agents that are perceived as humanlike (Lee, Park, & Song, 2005; Liebers & Schramm, 2017) or tested how users' parasocial relationships with media figures such as show hosts and celebrities influence users' decisions (Lennon, Lillethun, & Buckland, 1999; Lim & Kim, 2011). Therefore, this study is the first, to the researcher's knowledge, to empirically test this framework to explain the new type of social relationships with the voice assistants.

Third, the study contributes to the anthropomorphism and human-machine interaction literature by investigating how anthropomorphized machines can play a role similar to salesperson and influence consumers. Despite a great deal of literature explaining the positive impact of anthropomorphization on consumers, the consumer research literature is limited to anthropomorphizing products (Aggarwal & McGill, 2007) and brands (MacInnis & Folkes, 2017). In human-machine interaction literature, the scope was limited to understanding the human tendency to both perceive computers as human minded and to apply social rules to them (Nass & Moon, 2000; Nass, Steuer, & Tauber, 1994), and computers' role as shopping assistants has never been examined. Thus, this study will be one of the first attempts to combine these studies to explain the new voice shopping phenomenon.

This study also aims to provide important practical implications for retailers in the voice shopping market. First, understanding the underlying mechanism of voice assistant

persuasion effects on consumers will suggest ways in which retailers can best utilize the websites and voice shopping. For example, the findings would suggest whether fostering consumer-voice assistant relationship is important for influencing consumers' decision-making processes. If this is true, retailers should consider ways to enhance the relationship with consumers through websites and voice assistants in the long run.

Second, the findings will provide a set of practical suggestions for retailers by investigating the boundary conditions such as product type and interaction style. For example, if consumers form different perceptions of voice assistants and websites, they should evaluate the recommended product in accordance to how they think of the recommender (i.e., voice assistants and websites). If this is true, consumers may find certain recommended products more appealing because they are presented on websites or voice assistants. Thus, the findings will suggest retailers should consider developing strategies on what type of products to recommend to the consumers using different shopping mediums.

### **1.5. Definition of Terms**

**Anthropomorphism:** Imbuing humanlike characteristics, motivations, emotions, and intentions to imagined or real behavior of nonhuman objects (Epley et al., 2007).

**Artificial Intelligent:** Machines that perform the functions that require intelligence when people perform them (Kurzweil, 1990).

**Avatar:** Artificial, computer-animated representations of humans existing within the virtual environment (Bente, Rüggenberg, Krämer, & Eschenburg, 2008).

**Chatbot:** a computer program that conducts a conversation with the user (Mou & Xu, 2017).

**Experience product:** Products that are hard to inspect prior to using them (Nelson, 1970).

**Humanlikeness:** The extent to which the gadget had humanlike traits (Epley et al., 2007).

**Parasocial interaction:** The illusionary experience of a viewer with personas as if they were present and were engaged in a reciprocal relationship (Horton & Wohl, 1956).

**Parasocial relationship:** The seeming face-to-face interpersonal relationship between the viewer and the media character as a result of the parasocial interaction (Horton & Wohl, 1956).

**Recommender systems:** Software that provides recommendations based on data mining and analysis techniques (Yoo & Gretzel, 2011).

**Search Products:** Products with features and characteristics easily evaluated prior to purchasing (Nelson, 1970).

**Shopping medium:** Medium, the means of communication (Shankar et al., 2016), for shopping such as mail-order catalogs, in-home shopping, Internet, and voice assistants.

**Social robots:** Robots made to interact closely with humans as artificial companions and helpers in our homes, hospitals, schools, shopping malls, and beyond (Broadbent, 2017).

**Voice shopping:** Shopping through voice assistants such as Alexa and Google Home.

**Voice assistant:** A voice-controlled smart device designed to provide personal assistance for user's daily activities (Lee & Choi, 2017).

## **CHAPTER 2**

### **LITERATURE REVIEW**

This chapter first provides a review of the literature regarding voice assistants and voice shopping to discuss their characteristics and implications. Next, the theoretical background section reviews the two major theoretical frameworks that were used to build the current study: anthropomorphism and parasocial interaction theory. Lastly, the hypotheses are developed based on the reviewed theories and literature, and the research model is presented.

#### **2.1. Background Literature**

##### **2.1.1. Voice Assistant**

A voice assistant is a voice-controlled smart device designed to provide personal assistance for user's daily activities (Lee & Choi, 2017). The device is activated when a user calls out its name (or a "wake word"). It then understands and processes the user's voice command and returns the most appropriate answer. A voice assistant can perform various functions. It can play music, set alarms, and provide weather and traffic information. Because these functions are closely tied to everyday life, voice assistants are likely to be used daily.

Voice assistants can take various forms such as Bluetooth speaker devices (e.g., Amazon Echo, Google Home) or as software agents on smartphones or computers (e.g., Microsoft's Cortana). Compared to the earlier voice-recognition devices, the current voice assistants can respond to a wide array of random commands by retrieving responses from the central computing system via Internet (Hoy, 2018). For example, dictation

software such as Dragon dictation and Google Chrome's voice search skills are limited to simply converting speech-to-text or text-to-speech while Amazon Echo or Google Home can converse, responding vocally to questions such as "what should I eat today?"

Voice assistants can complete activities similar to those of computers and mobile phones. Voice assistants can play music, add items to the shopping list, and order products by accessing to users' account on websites. Voice assistants can search various information available on the web by connecting to the Internet, which is similar to typing into a search engine to find information. Also, voice assistants can set a timer or a reminder, send a text or email, which are normally done on mobile phones.

Although voice assistants' usage may be similar to other computing devices, voice assistants are different from them in several ways. First, voice assistants operate in response to users' voices whereas computers and mobile phones require users to manually operate the devices. For example, users of voice assistants call out the device's name (e.g. "Alexa", "Okay, Google") to start operating the device from anywhere within the voice assistant's hearing range. On the other hand, users of computers and mobile phones need to turn these devices on. They then need to open a web browser such as Internet Explorer or Google Chrome and navigate through different webpages to locate the information they need. Therefore, using voice assistants require much less time and effort than using computers and mobiles phones.

Second, voice assistants assume a persona to respond to users' commands, referring to themselves as "I", while computers and mobile phones do not indicate a perspective. For example, when a user asks a question, a voice assistant may say "I found this information on the website." This ability to talk directly to users lends the voice

assistant a sense of human agency. Meanwhile, computers and mobile phones simply present search results in response to user inquiries.

Third, voice assistants present information sequentially one-by-one while other devices often present multiple pieces of information concurrently. Voice assistants are designed to complete one activity at a time because processing multiple sound sources at once can significantly increase the recognition error rate (Hansen, 1995). Therefore, a voice assistant will pause whatever it is doing when its name is called out to listen to users' commands. Computers and mobile phones are less likely to experience a similar problem because multiple items can be displayed on a screen concurrently (Quist & Goldstein, 2003). For example, search results, an advertisement, the current time, and a number of running programs can all be displayed on a single screen.

Research on voice assistants is still in its infancy, with most existing studies limited to describing voice assistants' features and current usage behavior. For example, researchers have examined the development of the voice search interfaces (Clark, Dutta, & Newman, 2016; Schalkwyk et al., 2010), voice assistants' potential security and privacy vulnerabilities (Apthorpe, Reisman, & Feamster, 2016; Chung, Iorga, Voas, & Lee, 2017), and different types of voice assistants (Hoy, 2018; López, Quesada, & Guerrero, 2017). The few studies which focus on users' perception of voice assistants are limited to descriptive studies without a clear theoretical framework (Cecchinato & Harrison, 2017; Purington et al., 2017). For example, Purington et al. (2017) analyzed 587 customer reviews for Amazon Echo to see how the users treated Amazon Echo, while Cecchinato and Harrison (2017) reflected upon their experiences with Amazon Echo to better understand home users' common challenges.



### **2.1.2. Voice Shopping**

Voice shopping is a way for consumers to shop from online retailers using voice assistants. The first voice shopping service was launched in March of 2017 by Amazon (BusinessWire, 2017). Since then, major retailers such as Walmart, Target, Best Buy, Uber, and Domino's have partnered with Amazon and Google to sell products by using voice assistants (Halzack, 2017). Voice assistants facilitate the shopping experience via various functions such as reviewing promotional deals, reminding the user of the items in the shopping cart, and providing delivery status updates.

Voice shopping has several important differences from other online shopping such as shopping using a computer or a mobile phone. One significant difference between voice shopping and other online shopping methods is the type of interaction embedded within the process. The shopping process in voice shopping is completed through a conversation between a shopper and a voice assistant. For example, shoppers using voice assistants will say "Alexa, order toilet paper" whereas shoppers using PCs will type "toilet paper" in the search box. Whereas voice shopping consumers phrase sentences as if they were talking to another human being, website shopping consumers use only keywords to search the product database. Moreover, the way a website or a voice assistant responds to users' commands is very different. Whereas websites display responding information on the screen, voice assistants verbally present information. For example, when a consumer searches for toilet paper options with a voice assistant, the voice assistant might say, "Based on your previous order history, I found (product name). It is (product price) dollars in total. Should I order it?" When no previous history exists, it will say, "The top choice for toilet paper is (product name). It is (product price) dollar in

total. Should I order it?” Therefore, making orders with voice assistant works like a consumer asking another person for information about a specific product and then telling them to buy it for them.

Additionally, voice shopping is a faster and easier way to shop than website shopping because of its always-on feature (BusinessWire, 2017). Once users enter their information into a voice assistant, it keeps users logged-in and can access user’s information (e.g., account information, order history) to activate upon request (WalkerSands, 2017). Thus, consumers can make an order without providing address or payment information. A simple “yes” spoken in response to a voice assistant’s question, “should I order it?” completes the order. This is unlike traditional website shopping in which consumers must first manually turn on a computer or a mobile phone, open a website, log into their account, and enter additional information such as their address and payment details to make a purchase. Although some online retailers enable one-click purchase options (e.g., Amazon), users still need to turn on their computer, open the web browser, and log-in to purchase from these websites.

The way product information is presented marks another difference. While website shoppers receive information in a visual format (e.g., text or image), voice shoppers receive information in an auditory format (e.g., sounds). It is only when users decide to log on to the mobile application or the website that the visual information becomes available for voice shopping users. Given that different information formats differently affect how people process information (Kellogg, 2001), the same information presented in a different format (visual vs. verbal) should be received differently by

consumers. For example, people can easily detect a sound played from anywhere around them but are more likely to miss textual information presented behind them.

## **2.2. Theoretical Background**

### **2.2.1. Anthropomorphism**

Anthropomorphism refers to seeing a nonhuman as a human or as having human traits. The term originally came from the Greek word “anthropos” meaning human or person, which reflects the tendency to perceive nonhuman objects as humans (Guthrie, 1993). Studies have shown that people automatically anthropomorphize nonhuman objects (Kim & Sundar, 2012; Nass & Moon, 2000). This tendency toward anthropomorphization is so strong that people will attribute human traits to an object even when they know the object is clearly nonhuman (Guthrie, 1993).

Epley et al. (2007) offer three explanations as to why people anthropomorphize nonhuman objects. The first is effectance motivation, the motivation to explain and understand the behavior of other agents. When people are in an unfamiliar environment, they tend to use their own knowledge to understand the surroundings. Often, human-related knowledge is used to interpret the unfamiliar environment because all people are relatively familiar with themselves, and thus other humans. Therefore, the need to reduce uncertainty and to master one’s environment induces people to engage in anthropomorphism. The second is sociality motivation, which is the desire for social contact and affiliation. Because sociality motivation is the fundamental need for affiliation and companionship, people are programmed to find other humans (Cacioppo & Patrick, 2008). Such an innate tendency increases the chance that people will recognize

nonhuman objects as humans. This has been proven through studies which showed that people who need companionship and affiliation engage in anthropomorphization more than others (Bartz, Tchalova, & Fenerci, 2016; Epley et al., 2007) to compensate for the human interactions they have been deprived of (Epley et al., 2007; Guthrie, 1993). Third, when an object possesses certain traits that remind people of humans, they can automatically trigger anthropomorphism. The human traits of an object influence people to easily relate the object with human knowledge, which in turn enhances the tendency to anthropomorphize. The human traits associated with an object that trigger anthropomorphism is referred to as anthropomorphic cues (or social cues).

Previous research has identified a wide range of types of anthropomorphic cues (Aggarwal & McGill, 2007; Epley et al., 2007; Nass & Moon, 2000; Waytz, Gray, Epley, & Wegner, 2010), including very abstract or simple cues, which are effective insofar as they suggest unique human traits. For example, detailed facial features (DiSalvo, Gemperle, Forlizzi, & Kiesler, 2002), a simple drawing of an unrealistic face, a human-shaped object (Aggarwal & McGill, 2007), animacy (Morewedge, Preston, & Wegner, 2007), voice (Lee & Nass, 2004; Qiu & Benbasat, 2009), perceived interactivity, and perceived agency (Burgoon et al., 2000; Qiu & Benbasat, 2009) can all induce anthropomorphization.

Closely related to the current study context, the literature on human-computer interaction (HCI) documented evidence of people anthropomorphizing computers and applying social rules (e.g., reciprocity, stereotypes) to them (Kim & Sundar, 2012; Nass & Moon, 2000). Nass and colleagues (1994) are among the pioneers who examined how people attribute human traits to computers. For example, Reeves and Nass (1996)

reported that people can perceive computers as social actors and reciprocate when they received help from computers. Compared with the control group which evaluated a new computer, the group which evaluated the computer they had received help from rated its performance more positively. Nass and Moon (2000) reported that an anthropomorphic cue (i.e., a facial image) displayed on the computer monitor triggered anthropomorphization of computers and made people apply social cognition rules. People favored computers which display a facial image like their own (i.e., of the same ethnicity) and evaluate such a computer as more trustworthy.

Consumer researchers have also demonstrated that, when products are anthropomorphized, people respond to them as they would respond to another human (Aggarwal & McGill, 2007; Kim & McGill, 2011; Landwehr, McGill, & Herrmann, 2011; Mourey, Olson, & Yoon, 2017; Qiu & Benbasat, 2009; Touré-Tillery & McGill, 2015). Studies report that people respond positively to anthropomorphized products because they are perceived as having consciousness and responsibility, which makes them more credible (Aggarwal & McGill, 2007) and stronger candidates for a long-term relationship (Chandler & Schwarz, 2010). For example, compared to other products, anthropomorphized products are liked more by consumers (Aggarwal & McGill, 2007), are less likely to be replaced (Chandler & Schwarz, 2010), and make consumers spend more money to learn about their attributes (Wan, Chen, & Jin, 2016). Therefore, compared to non-anthropomorphized products, anthropomorphized products can have greater persuasive power (Aggarwal & McGill, 2007; Chandler & Schwarz, 2010; Hur, Koo, & Hofmann, 2015; Kim & McGill, 2011; Touré-Tillery & McGill, 2015).

### **2.2.2. Parasocial Interaction Theory**

Parasocial interaction theory (Horton & Wohl, 1956) explains that people can develop a felt social relationship through an imagined interaction with others. Although the theory was originally proposed to describe the development of social relationships between an audience and media figures (e.g., celebrities) (Horton & Wohl, 1956), the theory was later used to describe felt social relationships between people and non-human agents such as avatars (Fox, Bailenson, & Binney, 2009), chatbots (Edwards, Edwards, Spence, & Shelton, 2014; Mou & Xu, 2017), recommender systems (Burgoon et al., 2000; Qiu & Benbasat, 2009) and robots (Dibble, Hartmann, & Rosaen, 2016; Hartmann, 2008; Kramer, Lee, Peng, Jin, & Yan, 2006; Yaghoubzadeh, Kopp, & Pitsch, 2013; Xiang et al., 2016).

The theory posits that people often experience parasocial interaction, the illusionary experience of two-way human-to-human interaction when there is no real interaction. Parasocial interaction is unlike real social interaction in that it is one-sided, lacks reciprocity, and is controlled only by the person who imagines the interaction (Horton & Wohl, 1956). Despite its imaginary nature, it has been demonstrated that a person in parasocial interactions feels reciprocity and rapport with the counterpart (Hartmann, 2008; Horton & Wohl, 1956). Over time, repeated parasocial interactions lead one to gradually develop an illusory interpersonal relationship of friendship and intimacy with the counterpart. This relationship is referred to as a parasocial relationship.

The process of parasocial relationship development resembles that of interpersonal relationships between humans (Rubin & McHugh, 1987). Typical interpersonal relationships are built through increased communications between two

people. Increased communications reduce uncertainty and increase the liking of and perceived intimacy with the counterpart (Berger & Calabrese, 1975). Similarly, parasocial relationships are developed through increased parasocial interactions and subsequent positive evaluation of the counterpart. In the context of TV show host and audience, a large amount of TV exposure (i.e., increased parasocial interaction) has been positively related to the liking of the show host and interpersonal involvement with the show host (i.e., increased parasocial relationship) despite the fact that the study subjects had never met the show host in person (Park & Lennon, 2006; Xiang et al., 2016).

Researchers have traditionally measured only the parasocial relationship to assess parasocial interaction phenomena, without measuring the parasocial interaction itself (Dibble et al., 2016; Hartmann, 2008; Rubin, Perse, & Powell, 1985; Rubin & McHugh, 1987). Several measures have been suggested to assess the parasocial relationship, which focused on capturing users' interpersonal involvement with the media performer as a result of the parasocial interaction (Levy, 1979; Rubin, Perse, & Powell, 1985; Rubin & McHugh, 1987). Although a few researchers have recently developed separate measurements to capture the illusory experience of a conversation (Hartmann & Goldhoorn, 2011), most studies focus on assessing the parasocial relationship (Banks & Bowman, 2016; Lewis, Weber, & Bowman, 2008; Xiang et al., 2016).

#### **2.2.2.1. Facilitators and Outcomes of Parasocial Relationship Development**

Several factors and conditions have been found to facilitate the process of parasocial relationship development (Giles, 2002; Hartmann, 2008; Hartmann & Goldhoorn, 2011; Horton & Wohl, 1956). First, the other person's characteristics and

behaviors can increase one's perception of two-way interaction. For example, a media figure's communication style and gestures (e.g., addressing the audience in a talk show or looking directly into the camera to create the illusion of eye contact) can foster the illusory experience of reciprocity and rapport (Hartmann & Goldhoorn, 2011; Horton & Wohl, 1956). Second, some people tend to engage in parasocial interaction more than others because of a chronic or situational motivation to seek social interactions. For example, research has suggested that lonely people (Rubin et al., 1985) and empathetic people (Hartmann & Goldhoorn, 2011) are more likely to experience parasocial interaction.

Research has documented that parasocial relationships result in outcomes comparable to those of interpersonal relationships. Because the parasocial relationship is characterized by friendship and intimacy (Horton & Wohl, 1956; Rubin et al., 1985; Rubin & McHugh, 1987), researchers have found that people become committed to their relationship with the other partner they have never met in person. Previous literature has demonstrated that parasocial relationships are positively related to trust and loyalty (Labrecque, 2014), relationship commitment (Rubin et al., 1987), and enjoyment (Hartmann & Goldhoorn, 2011).

The parasocial relationship literature in the field of retail and marketing reports that the parasocial relationship between consumers and their counterpart (e.g., media figures, avatars) increases the likelihood of consumers accepting the counterpart's arguments and suggestions (Park & Lennon, 2004; 2006; Rubin & Step, 2000; Xiang et al., 2016). Park and Lennon (2004) studied parasocial relationships between a TV home shopping show host and the audience and found that parasocial relationships increased



impulse purchases. Similarly, Rubin and Step (2000) reported that forming a parasocial relationship with the radio show host was associated with the increased perceived credibility of the host, which in turn influenced the extent to which audiences agreed to the radio host's suggestions and the intention to follow the radio host's suggestions. Furthermore, a parasocial relationship with a brand is associated with a willingness to provide private information to the brand (Labrecque, 2014).

#### **2.2.2.2. Applying the Parasocial Interaction Theory to Voice Assistants**

The parasocial interaction theory assumes that both participants in the relationship are humans although they do not truly interact with each other. However, research suggests that people can imagine social relationships with non-human beings (e.g., cartoon characters) and the theory has been extended to non-human partners (Giles, 2002). When the counterpart in the interaction is non-human, the perceived humanlikeness of the counterpart is an important precondition for parasocial interaction to occur (Banks & Bowman, 2016; Hartmann, 2008) because it allows people to see the other being as existing and real rather than as fictional and artificial (Giles, 2002; Hartmann, 2008).

Voice assistants satisfy the precondition of parasocial interaction because of the high level of humanlikeness. Voice assistants possess many anthropomorphic cues that automatically make users assign human characteristics to the device. The way voice assistants operate (e.g., use of voice in interaction, the ability to generate relevant answers, and immediate responses to the user's command or questions) provides anthropomorphic cues because of its resemblance to the way humans talk. Therefore, it is

likely that users perceive voice assistants to be highly humanlike and interact with them as if they are human partners in a relationship.

## **2.3. Proposed Model and Hypotheses**

### **2.3.1. Anthropomorphism of the Shopping Medium**

According to the anthropomorphism literature (e.g., Aggarwal & McGill, 2007; Nass & Moon, 2000; Waytz et al., 2010), consumers anthropomorphize non-human objects (e.g., computers and voice assistants) when the objects have anthropomorphic cues. Online shoppers use various technologies such as PCs, mobile phones, tablets, and voice assistants, and these non-human technologies can be more or less anthropomorphized because some possess more anthropomorphic cues than others.

Compared to other traditional technologies, voice assistants are expected to be more anthropomorphized. A voice assistant communicates verbally with its users whereas other devices like PCs rely primarily on text and visuals. Voice is known to be a powerful anthropomorphic cue. Previous research on human-computer interaction has found that people tend to treat machines as humans when the machines communicate with a voice (Lee & Nass, 2004; Nass & Moon, 2000; Nass et al., 1994). For example, Nass and colleagues (1994) found that people treated a computer as a human when they heard the computer's voice (i.e., a pre-recorded human voice).

Voice is a robust anthropomorphic cue even if the voice is very nonhuman. Lee and Nass (2004) demonstrated that people responded to a synthetic computer voice generated by a text-to-speech software as an individual with a human mind. The effect of voice on anthropomorphism remained strong even when participants were explicitly told

that the synthetic voices were created simply by automatically converting text to speech via the software.

Further, research suggests that voice is a stronger anthropomorphic cue than visual information. Nass and Yen (2010) found that a software agent's voice influences people's perception of the agent's humanlike characteristics such as personality more strongly than its written words.

In addition, the conversational interaction of users and voice assistants would facilitate the perception of voice assistants as human agents. Thanks to the AI that enables machines to perform activities that require human intelligence (Kurzweil, 1990), voice assistants can process users' voice commands and generate responses similar to what humans might say (e.g., Lee, 1989; Russell & Norvig, 2010). Thus, voice assistants can engage in conversation with users in a natural manner, as if they are a human with cognitive skills. Therefore, voice assistants' unique features are expected to trigger users to perceive voice assistants as more humanlike than websites. Therefore, the following is hypothesized:

**H1.** Consumers will perceive voice assistants to be more humanlike than websites.

### **2.3.2. Parasocial Relationship with the Shopping Medium**

The parasocial interaction theory (Hartmann, 2008) suggests that consumers are more likely to develop a parasocial relationship with anthropomorphized than non-anthropomorphized objects. This is because perceiving the artificial agent as a social actor capable of forming a relationship is an important precondition for experiencing

parasocial interaction with non-human agents (Hartmann, 2008). Considering that voice assistants are more likely to be perceived as a more humanlike agent than websites, consumers are expected to form a stronger parasocial relationship with voice assistants than websites.

Moreover, the way voice assistants interact with users can facilitate parasocial interactions. Voice assistants address users' presence by personalizing their interaction with specific consumers, such as by calling their names and responding based on users' previous behavioral data. This behavior resembles media techniques used to enhance the experience of parasocial interaction experience, such as media figures looking directly into the camera to create the feeling of eye-contact with the viewer. Such bodily addressing behavior of the media figure creates an illusion that the media figure acknowledges the viewers' presence, and that there is an intimate reciprocal social interaction (Dibble et al., 2016; Horton & Wohl, 1956). Therefore, the following hypothesis is posited:

**H2.** Consumers will form a stronger parasocial relationship with a voice assistant than with a website.

### **2.3.3. Shopping Medium's Persuasion Effectiveness**

Consumers can be easily persuaded by others who they have a close relationship with and feel connected to (e.g., Brown & Reingen, 1987; Cialdini, 2001; Nass & Yen, 2010; Wang & Chang, 2013). Because we cannot scrutinize all available information due to our limited cognitive capacity, people tend to use the opinions of others (Nass & Yen, 2010). Persuasion literature shows that consumers' attitudes toward the recommended

products and services often depend on their relationship with the salesperson (Cialdini, 2001), endorser (Reinhard & Messner, 2009), as well as friends (Wang & Chang, 2013). Specifically, studies found that stronger social ties (e.g., friends) exert greater influence over a consumer's decisions than weaker social ties (e.g., stranger, acquaintances) (Brown & Reingen, 1987; Wang & Chang, 2013). For example, Wang and Chang (2013) reported that consumers perceived their close friends as being more able to assist their shopping and to provide useful information for evaluating product quality than their acquaintances. Further, consumers were more likely to purchase the product when their close friends recommend it than when their acquaintances recommend it.

Research supported that consumers are also persuaded by a person that they built a parasocial relationship with. Studies support that a parasocial relationship can positively affect a consumer's decision to buy a recommended product (Basil, 1996; Colliander & Dahlén, 2011; Park & Lennon, 2004; Park & Lennon, 2006). For example, Basil (1996) conducted a survey and found that a parasocial relationship with a celebrity was an important determinant which increases the effectiveness of celebrity endorsement. Also, in a study of consumers' parasocial relationships with bloggers, Colliander and Dahlén (2011) reported that bloggers' advertising messages were associated with more positive attitudes toward brands and increased purchase intentions than identical messages presented by online magazines.

Because consumers are expected to form a parasocial relationship with voice assistants, consumers are likely to positively evaluate what voice assistants offer. Although no studies, by the researcher's knowledge, directly tested whether forming a stronger parasocial relationship with non-human agents leads to positive consumers'

responses, previous studies have shown forming a stronger parasocial relationship with non-human agents lead to other positive outcomes (Lee, Park, & Song, 2005; Qiu & Benbasat, 2009). For example, Lee, Park, and Song (2005) demonstrated that when users perceived a robot pet (AIBO) as more real and formed a stronger parasocial relationship with it, they found it more attractive and were also more interested in buying it. Likewise, Labreque (2014) showed that forming a stronger parasocial relationship with a brand is associated with an increased willingness to share personal information with the brand and enhanced brand loyalty. Therefore, consumers who are expected to build a stronger parasocial relationship with websites than voice assistants are likely to respond more positively to what voice assistants have to offer.

Further, this study posits serial multiple mediation processes with two mediators (perceived humanlikeness and parasocial relationship) mediating the relationship between shopping medium type and recommended product evaluation. Because the perceived humanlikeness of the non-human agent is an important precondition for parasocial interaction to occur (Banks & Bowman, 2016; Hartmann, 2008), humanlikeness and parasocial relationship are expected to be causally correlated (Hartmann, 2008; Lee et al., 2005; Liebers & Schramm, 2017). For example, Liebers and Schramm (2017) reported that a book character that was perceived as more real by readers was positively associated with a closer parasocial relationship. Similarly, Jin (2010) demonstrated that perceiving the avatar in second life as more real and present predicted a closer parasocial relationship. Therefore, voice assistants that are more likely to be perceived as humanlike and develop a stronger parasocial relationship compared to websites will have a positive influence on consumers' decision. Therefore, the following hypotheses are posited:

**H3.** Consumers will evaluate a product recommended by a voice assistant more positively than one recommended by a website.

**H4.** Perceived humanlikeness and parasocial relationship will mediate the relationship between shopping medium type and evaluation of the recommended product.

#### **2.3.4. Moderating Effects of Interaction Style**

Two interaction styles, task-oriented interaction and socially-oriented interaction, are often used to understand the effect of different interaction styles on consumers (Keeling, Mcgoldrick, & Beatty, 2010; Van Dolen, Dabholkar, & De Ruyter, 2007). Task-oriented interaction refers to goal-oriented and purposeful interaction while socially-oriented interaction (or interaction-orientation interaction) refers to interactions focused on personalizing and socializing (Keeling et al., 2010; Van Dolen et al., 2007; Williams & Spiro, 1985). Previously, researchers reported that a salesperson's interaction style is closely related to sales (Williams & Spiro, 1985), trust and patronage intention (Keeling et al., 2010), and satisfaction of the interaction (Van Dolen et al., 2007). Specifically, van Dolen et al. (2007) demonstrated that socially-oriented interaction was associated with greater relationship commitment than task-oriented interaction. Therefore, different interaction styles should be closely related to the strength of a parasocial relationship.

Parasocial interaction theory also provides evidence that interaction style would influence the strength of the parasocial relationship. For example, Levy (1979) suggested that media figures employing a more warm, conversational tone of writing leads to

parasocial relationships. Also, Hartmann and Goldhoorn (2011) showed that an actor creating more social contact (e.g., looking directly into the camera to create the perception of eye-contact) in the video clip can enhance the experience of parasocial interaction and encourage audiences to become committed to the relationship.

Although voice assistants may not intentionally take an interaction style, the way users utilize voice assistants can lead voice assistants to produce more socially-oriented or task-oriented responses. For example, when users ask a voice assistant to turn on a radio station, it will only complete the requested task and turn on the radio. However, when users ask a voice assistant to give compliments, the response is likely to be relatively social in its nature. Because the interaction style influences the likelihood of parasocial relationship development, how users interact with voice assistants is expected to influence the strength of the parasocial relationship between users and voice assistants. This perception, in turn, is expected to affect how users evaluate the given voice assistants' offers.

Specifically, this effect of interaction style is expected to be stronger with voice assistants than websites because voice assistants are more humanlike than websites. Interaction style will be meaningful when users see the other counterpart as a social partner. Without humanlike perception, the websites will be perceived and evaluated as a tool rather than a social actor, and different commands will be considered only as different ways to use the tool. Therefore, the following hypothesis is posited:



**H5-1.** The interaction style moderates the effect. Specifically, socially-oriented interaction (vs. task-oriented interaction) with a voice assistant will lead users to a) perceive the voice assistant as more humanlike, b) strengthen the parasocial relationship with the voice assistant, and c) evaluate the voice assistant's recommendation more positively.

**H5-2.** For website users, there will be no significant difference between the two interaction styles for a) humanlikeness perception, b) parasocial relationship strength with the website, and c) recommended product evaluation.

### **2.3.5. Moderating Effect of Product Type**

In addition, this study proposes that the effect of a parasocial relationship between users and voice assistants on the evaluation of the recommended product is more critical for certain products. Experience products are hard to inspect prior to use. In contrast, search products have features and characteristics that are easily evaluated prior to purchase (Nelson, 1970). Examples of experience goods include movies and foods whereas examples of search goods include hardware and tools. Previous studies have shown that consumers are more influenced by others' opinions when purchasing experience products than when purchasing search products (King & Balasubramanian, 1994; Senecal & Nantel, 2004). For example, King and Balasubramanian (1994) reported that consumers who evaluate an experience product (e.g., a film-processing service) relied more on others' opinions than consumers who evaluate a search product (e.g., a 35-mm camera). Senecal and Nantel (2004) also showed that people were influenced more

by websites' suggestions when the recommended product was an experience product than a search product.

Previous studies reported that the strength of social relationship ties between a consumer and a persuader critically impact a consumer's decision to purchase the recommended product (Brown & Reingen, 1987; Wang & Chang, 2013). Because consumers are expected to form a stronger parasocial relationship with voice assistants compared to websites, they are likely to be influenced more by voice assistants' recommendations of experience products than websites' recommendations of the same products. In contrast, because consumers purchasing search products are less likely to be influenced by others' opinions (Senecal & Nantel, 2004), consumers' evaluation of the recommended search product are unlikely to be influenced by their relationship tie with the shopping mediums. Therefore, the following hypotheses are posited:

**H6-1.** The product type moderates the effect. Specifically, for experience product, consumers will evaluate the recommended product more positively when it is recommended by a voice assistant than a website.

**H6-2.** For search product, consumers' evaluation of the recommended product will be unaffected by the shopping medium type.

The research model of the current study is illustrated in Figure 1.

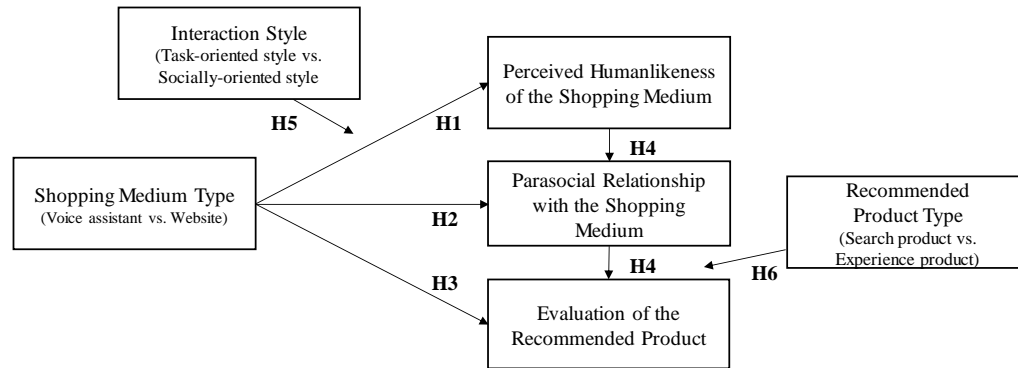


Figure 1. The research model of the proposed relationships for a parasocial relationship with the shopping medium

## 2.4. Overview of the Research

Two experiments were conducted to test the proposed hypotheses. An experimental design is most appropriate for this study because the aim of this research is to demonstrate the causal effect of the shopping medium type on consumers' evaluation of the recommended product. From the available types of experimental designs, a factorial design is selected for all studies on account of its ability to capture the complexity of the real world (Frankfort-Nachmias, Nachmias, & DeWaard, 2015). A factorial design generally provides more insights into a given topic since having two or more independent variables makes it possible for researchers to understand two or more relationships within the phenomenon in question (Frankfort-Nachmias et al., 2015). Also, a factorial design improves external validity (Frankfort-Nachmias et al., 2015). Because the real world is complex, the use of multiple independent variables better captures the dynamic interactions found in the real world. The unique advantage of a factorial design

is that a single independent variable, irrespective of the variations in other independent variables in question, needs to have a significant impact on the outcome variable.

A lab experiment was conducted for Study 1. Study 1 tested the main proposition that consumers are likely to evaluate the recommended product more positively when it is given by a voice assistant than by a website because consumers are expected to develop a stronger parasocial relationship with voice assistants that are more humanlike than websites. To test that anthropomorphism and parasocial relationship is the underlying mechanism, consumers' interaction style with the shopping medium type was investigated as a moderator. Therefore, Study 1 tested H1 through H5.

Study 2 was designed to confirm the propositions and test the downstream effects of anthropomorphism and parasocial relationship in different consumer decision making situations. The interaction effect of shopping medium type and product type (experience product vs. search product) was tested (H6). Also, Study 2 was an online experiment, of which participants were more representative of general consumers. Most importantly, Study 2 developed a hypothetical retailer to test the propositions while excluding the existing relationship participants had with shopping mediums. The study was reviewed and approved by the University of Minnesota institutional review board (STUDY00001456).

## **CHAPTER 3**

### **STUDY 1**

This chapter presents the methods, results, and discussion for the Study 1. Two pilot studies conducted for stimuli development are discussed in this section. After discussing the Study 1 methods - experiment design, stimuli development, instruments, data collection, and study procedure - Study 1 results and discussion are presented.

#### **3.1. Methods**

##### **3.1.1. The Objective of the Study and Study Design**

The purpose of Study 1 was to examine whether consumers evaluate the product recommended by a voice assistant more positively than a website because they develop a parasocial relationship with the voice assistant. This study proposed the way consumers interact with a shopping medium as one way to influence the humanlikeness perception of the shopping medium. Study 1 employed a two (shopping medium type: voice assistant vs. website) by two (interaction style: task-oriented vs. socially-oriented) between-subjects factorial design experiment.

##### **3.1.2. Stimuli Development**

###### **3.1.2.1. Manipulation of Shopping Medium Type**

To manipulate the shopping medium type, two shopping scenarios varying the shopping medium used in the scenario (voice assistant vs. website) were developed.

Shopping scenarios are frequently used to manipulate desired factors while controlling for other confounding factors in consumer research (Eastlick, Lotz, & Warrington, 2006).

In addition to traditional written descriptions, short videos that simulate a consumer's shopping experience were developed because a written scenario cannot clearly show how voice shopping works. Videos with sound can better simulate real shopping situations because voice assistants' vocal responses can be vividly and accurately depicted. In two versions of shopping videos (voice assistant vs. website), a shopper was shopping for the same product using the same search term and was presented with the same information including search results and add-on recommendations. No information that could hint at personal information of the shopper was revealed in the videos (e.g., body, face, voice) so that the participants could imagine themselves shopping in the situation depicted in the video. For the voice shopping video, the shopper's voice was replaced with subtitles. Similarly, in the website shopping video, only the computer screen was shown, and the shopper's behavior was implied with the mouse cursor movement. Due to the visual nature of the website condition, only the website video presented product images (see Figure 2).



Figure 2. Screenshot of the videos (Study 1).

Amazon Echo and the Amazon website were selected as the voice assistant and website because Amazon is the only company that sells products using both shopping mediums currently. Selecting a voice assistant and a website offered by the same company should minimize confounding factors caused by different brands. For example, comparing Walmart's products sold on the Walmart website with those sold on Google Home would make it difficult to identify whether any differences were caused by the shopping medium or the brand.

Each scenario was comprised of two parts. In the first part, the product search process was simulated. The participants saw a written instruction asking the participants to imagine searching for the desired product (i.e., herbal tea) using the assigned shopping medium type (i.e., Amazon Echo or the Amazon website). Then they read the following scenario:

*It was one of your typical days. On your way out, you received a text message about your package being delivered in the afternoon. However, you have other plans and were not going to come back home until very late. Because you have lost a few packages before, you did not want to leave the package outside. You decided to ask your neighbor to hold on to your package while you come back. Your neighbor was very kind and agreed to pick up your package.*

*Because this was the 3rd time you asked your neighbor to pick up your package, you wanted to give your neighbor a small gift for being so kind helpful. You knew that your neighbor was a big fan of Herbal Tea. So you decided to purchase **a box of Herbal Tea Bag** for your neighbor.*

The participants then watched the video that simulated the shopping process of a box of herbal tea. In the video, a shopper either asked Amazon Echo to search herbal teas or typed the command in the search bar on the Amazon website. They were presented with information of three herbal tea products.

After the video, the second part of the scenario began. The second part of the scenario depicted a purchase situation. in which the shopper placed an order and received a recommendation (i.e., add-on product). They viewed the following written statement:

*You did some more research on [**Alexa/the Amazon website**], but in the end, decided to purchase the product you initially selected. As you are purchasing the product, you see the following recommendation.*



The participants continued to watch the second video in which Amazon Echo or the Amazon website recommended a product. Amazon Echo verbally presented the product after saying “this is a frequently bought together item” and the Amazon website presented the recommended product in a pop-up box with the title, “this is a frequently bought together item.” The same product was recommended in both conditions.

The focus of this study was on the second part where the recommendation of an add-on product happened because the main hypothesis of the study is that consumers would be more influenced by a humanlike voice assistant than a website. The second part of the scenario is where the shopping medium presented an add-on product to influence shoppers to purchase more products. Therefore, to investigate if consumers are influenced by the voice assistant’s recommendation more than website recommendation, an add-on product would be more appropriate.

### **3.1.2.2. Manipulation of Interaction Style**

Task-oriented interaction refers to goal-oriented and purposeful interaction while socially-oriented interaction refers to interaction focusing on personalizing and socializing (Bass & Stogdill, 1990; Van Dolen et al., 2007; Williams & Spiro, 1985).

Previous studies have manipulated different interaction styles by applying the definition of the interaction styles to context-specific questions and providing prompts that lead to the intended interaction (Dabbish, Kraut, Dabbish, Kraut, & Patton, 2012; Keeling et al., 2010; Melero, 2011). For example, Dabbish et al. (2012) investigated the effect of interaction styles within the online game context (i.e., World of Warcraft) and defined task-oriented interaction as interaction directly related to the game play (e.g.,

what rotation do you use?) and socially-oriented interaction as interaction related to players' real lives outside the game (e.g., what did you do today?). Similarly, in the study of an avatar salesperson, Keeling et al. (2010) defined and operationalized the task-oriented interaction as interaction for task efficiency (e.g., focusing only on tasks) while the socially-oriented interaction as behavior enhancing physical and psychological closeness (e.g., moving closer toward the website users and offering more help).

Similar to the previous studies (Dabbish et al., 2012; Keeling et al., 2010), in the context of this study, the task-oriented interaction is defined as the interaction aiming to complete tasks using websites or voice assistants while socially-oriented interaction refers to interactions focused on entertainment and positive relationship building. Two pilot studies were conducted to identify a list of task-oriented and socially-oriented interactions in the context of the current study and to develop the instructions to manipulate task-oriented and socially-oriented interaction styles.

### **3.1.3. Pilot Study 1: Selecting Task-Oriented and Socially-Oriented Skills**

The purpose of Pilot Study 1 was to identify interactions that qualify for each interaction style. In a study investigating the effects of interaction styles in online gamers' behavior, Dabbish and colleagues (2012) identified task-oriented and socially-oriented messages following a two-step procedure. First, they collected and transcribed the conversations among the users during the trial runs. Second, they categorized the transcribed conversations into two types based on the definitions of the interaction styles. Then, the researchers developed two different transcripts with the identified messages.

Following the procedure used by Dabbish et al. (2012), the researcher collected and listed possible interactions users can have with Amazon Echo and on the Amazon website, then categorized the interactions into either task-oriented or socially-oriented interaction styles based on the user perception of each interaction.

First, the available skills were collected from the Amazon Echo mobile application and the Amazon website. For Amazon Echo, about 500 recommended skills displayed only on the main screen and on top of each category page were reviewed because Amazon Echo had about 36,000 skills. For the Amazon website, every skill on the menu bar, dropdown menu, and search and browse features were reviewed. The collected skills were assessed by the researcher to determine their applicability to the current study context. Some skills were very similar to one another and were collapsed into the same skill (e.g., “Alexa, what’s my flash briefing?”, “Alexa, what’s in the news?”). Some skills that required additional equipment (e.g., smart Wi-Fi light bulb) were removed. The process resulted in 32 skills for Amazon Echo and 26 skills for the Amazon website.

To categorize the identified skills into task-oriented or socially-oriented interaction styles, a survey was conducted. Fifty-four participants who were familiar with voice assistants were recruited through Amazon MTurk for 50 cents. The participants first read the definitions of task-oriented interaction and socially-oriented interaction. Participants then saw the list of possible skills for both shopping mediums and rated each skill on a 7-point scale (socially-oriented (1), task-oriented (7)) one at a time. Each set of skills was presented in a random order.

The mean age of the participants was 25.90 (range 18 to 30); 29 males (55%) and 25 females (45%) participated. The mean scores of each skill were calculated. Then, the skills were rank ordered so that a higher rank (and a mean score closer to 1) represented a more socially-oriented skill. A mean score closer to 7 and a lower rank represented a more task-oriented skill. The mean scores (Alexa: 3.11; the Amazon website: 3.12) were used as the cut-point to divide into two groups. The mean scores and the ranks of the skills are presented in Table 1 (voice assistant) and Table 2 (website). Four skills were removed or merged after reviewing the results. One skill on the Amazon website condition was merged into another similar skill (e.g., search what is available on Amazon Video and search what is available for Brita product) and one was removed because it was irrelevant to the study context (e.g., provide the ad feedback). Two skills of Amazon Echo that are both skills asking for wellness tips but were rated both as a socially-oriented skill and a task-oriented skill were excluded (e.g., “ask for health tips”, “ask for severe weather tips”).

Instead of finalizing the list of skills based on the Pilot Study 1 results, it was decided to test their applicability in the experimental setting in another pilot study because it was possible that participants might find some skills harder to use than others. Therefore, the remaining skills were grouped into two interaction styles based on the rank order and tested for their usability in Pilot Study 2.

Table 1  
*Pilot Study 1 Results for Voice Assistant*

Skills	Interaction Style		Mean	SE	SD	Skewness		Kurtosis	
	Rank	Type				Statistic	Std. Error	Statistic	SE
Alexa, do you love me?	1	Social	2.79	0.22	1.58	0.79	0.33	-0.17	0.64
Alexa, ask healthy habits <sup>a</sup>	2	Social	2.8	0.2	1.5	0.64	0.33	-0.6	0.64
Alexa, open cat translator. → Meew	3	Social	2.81	0.22	1.58	0.74	0.33	-0.24	0.64
Alexa, I feel sick	4	Social	2.87	0.21	1.53	0.72	0.33	-0.22	0.64
Alexa, play Earplay <sup>b</sup>	5	Social	2.91	0.21	1.6	0.49	0.33	-0.82	0.64
Alexa, compliment me.	6	Social	2.93	0.2	1.44	0.23	0.33	-0.52	0.64
Alexa, let's play twenty questions	7	Social	2.94	0.22	1.58	0.63	0.33	-0.79	0.64
Alexa, will you lie to me?	7	Social	2.94	0.21	1.57	0.58	0.33	-0.73	0.64
Alexa, start Song Quiz	9	Social	2.98	0.22	1.62	0.44	0.33	-0.82	0.64
Alexa, let's play True or False.	10	Social	3	0.23	1.67	0.68	0.33	-0.34	0.64
Alexa, launch guess the celebrity (game)	11	Social	3.02	0.22	1.62	0.44	0.33	-0.82	0.64
Alexa, how old are you?	12	Social	3.06	0.22	1.64	0.57	0.33	-0.72	0.64
Alexa, play guided meditation <sup>b</sup>	13	Social	3.07	0.23	1.67	0.38	0.33	-1.1	0.64
Alexa, where are you from?	13	Social	3.07	0.23	1.71	0.72	0.33	-0.3	0.64
Alexa, open Amazon Story time <sup>b</sup>	14	Social	3.06	0.22	1.64	0.63	0.33	-0.77	0.64
Alexa, are you happy?	14	Social	3.07	0.22	1.58	0.44	0.33	-0.74	0.64
Alexa, start being mean. <sup>b</sup>	17	Social	3.11	0.22	1.63	0.36	0.33	-1.11	0.64
Alexa, good morning?	17	Social	3.11	0.21	1.51	0.35	0.33	-0.7	0.64
Alexa, open severe weather safety tips <sup>a</sup>	19	Task	3.13	0.21	1.53	0.5	0.33	-0.97	0.64
Alexa, flip a coin.	20	Task	3.14	0.18	1.35	0.72	0.33	-0.33	0.64
Alexa, what is in my to-do list?	21	Task	3.15	0.21	1.56	0.74	0.33	-0.07	0.64
Alexa, add _____ to my to-do list?	22	Task	3.17	0.24	1.77	0.61	0.33	-0.55	0.64
Alexa, add coffee to my shopping cart?	23	Task	3.2	0.23	1.66	0.56	0.33	-0.55	0.64
Alexa ask Lottery.com for the latest powerball number <sup>b</sup>	23	Task	3.2	0.23	1.65	0.13	0.33	-1.23	0.64
Alexa, what is today's news highlight?	25	Task	3.24	0.22	1.3	0.25	0.33	-1	0.64
Alexa, what's 2,347 multiplied by 1,352?	26	Task	3.28	0.24	1.73	0.46	0.33	-0.63	0.64
Alexa, when was the first Star Wars movie released?	27	Task	3.3	0.23	1.67	0.32	0.33	-0.86	0.64
Alexa, when will the new avengers movie be released?	27	Task	3.3	0.25	1.8	0.37	0.33	-1.3	0.64
Alexa, open movie finder	29	Task	3.37	0.22	1.61	0.36	0.33	-0.57	0.64
Alexa, open best buy channel	30	Task	3.39	0.22	1.6	0.23	0.33	-1.12	0.64
Alexa, play K-Love radio station	31	Task	3.41	0.23	1.65	0.22	0.33	-0.92	0.64
Alexa, open grilled cheese recipes.	32	Task	3.52	0.24	1.79	0.32	0.33	-0.99	0.64

\*Note: Rank obtained based on the mean scores; <sup>a</sup> Skills removed after Pilot Test 1; <sup>b</sup> Skills removed after Pilot Test 2

Table 2  
*Pilot Study 1 Results for Website*

Skills	Interaction Style		Mean	SE	SD	Skewness		Kurtosis	
	Rank	Type				Statistic	Std. Error	Statistic	SE
Browse Amazon blog	1	Social	2.78	0.21	1.54	0.612	0.33	-0.5	0.64
Browse the Amazon book review page	2	Social	2.93	0.22	1.6	0.93	0.33	0.14	0.64
Read one article from the Prime Newsletter	3	Social	2.94	0.16	1.16	0.57	0.33	0.04	0.64
Amazon Apps & Games <sup>b</sup>	4	Social	3.00	0.2	1.44	0.35	0.33	-0.93	0.64
Explore Amazon inspire (digital educational resources) <sup>b</sup>	4	Social	3.00	0.21	1.53	0.36	0.33	-0.99	0.64
Create an imaginary pet profile	6	Social	3.01	0.21	1.55	0.6	0.33	-0.41	0.64
Does the Amazon website greet you as you log-in?	7	Social	3.06	0.21	1.57	0.69	0.33	-0.09	0.64
Complete the Ad feedback <sup>a</sup>	7	Social	3.06	0.21	1.52	0.47	0.33	-0.28	0.64
Explore “Ideal list” and press a like button.	8	Social	3.06	0.21	1.79	0.55	0.33	-0.93	0.64
What music did the Amazon website recommend to you?	9	Social	3.13	0.21	1.51	0.22	0.33	-0.5	0.64
How old is the Amazon website?	10	Social	3.07	0.24	1.77	0.59	0.33	-0.68	0.64
Heart an item in the News & Interesting finds section	11	Social	3.10	0.22	1.58	0.44	0.33	-0.74	0.64
What are the award winning-books?	12	Social	3.11	0.2	1.46	0.47	0.33	-0.23	0.64
What movies did the Amazon website recommend to you?	12	Social	3.12	0.22	1.59	0.64	0.33	-0.63	0.64
What kinds of personalized offers the Amazon website provide?	14	Social	3.12	0.22	1.61	0.36	0.33	-0.77	0.64
Search for “I love NY” T-shirt	16	Task	3.16	0.22	1.64	0.57	0.33	-0.72	0.64
Search what is available on Amazon Video <sup>a</sup>	17	Task	3.17	0.24	1.75	0.75	0.33	-0.33	0.64
How much is it to watch an Avengers movie on Amazon?	18	Task	3.19	0.21	1.53	0.5	0.33	-0.97	0.64
Find the cheapest headphones on the Amazon website	19	Task	3.21	0.23	1.65	0.13	0.33	-1.23	0.64
Search one product from “Amazon basics” you may purchase	20	Task	3.22	0.24	1.77	0.44	0.33	-0.79	0.64
What are sponsored University of Minnesota products?	20	Task	3.22	0.23	1.72	0.45	0.33	-1.23	0.64
Check how many items there are for Brita product.	22	Task	3.24	0.22	1.58	0.36	0.33	-0.9	0.64
Find 3 items you may be interested in purchasing from Today’s deals section.	23	Task	3.26	0.25	1.8	0.44	0.33	-0.98	0.64
What is the international shipping policies?	24	Task	3.26	0.25	1.8	0.44	0.33	-0.98	0.64
Try adding three items into your shopping cart.	25	Task	3.3	0.24	1.78	0.37	0.33	-1.03	0.64
Add a bag of coffee bean to your shopping cart.	26	Task	3.31	0.22	1.61	0.64	0.33	-0.52	0.64

\*Note: Rank obtained based on the mean scores; <sup>a</sup> Skills removed after Pilot Test 1; <sup>b</sup> Skills removed after Pilot Test 2

### 3.1.4. Pilot Study 2: Evaluating the Instructions

The goal of Pilot Study 2 was to develop instructions for the main study and test if the participants could follow the instructions easily. In addition, Pilot Study 2 aimed to detect any possible problems the participants may encounter when they interacted with the shopping mediums in the lab.

Four versions of instructions (2 (Shopping medium type: voice assistant, website) x 2 (Interaction style: task-oriented, socially-oriented)) were developed based on the Pilot Study 1 result. In each instruction sheet, a brief introduction of the assigned shopping medium was presented first, focused on either the socially-oriented or task-oriented capacity of the shopping medium. Then, the list of either socially-oriented or task-oriented skills followed. The descriptions on the instruction sheets are provided below.

Voice assistant condition:

*Alexa is considered one of the most [skillful/social] voice assistant developed by Amazon. It is capable of performing various [tasks/entertaining tasks] such as [answering factual questions, making to-do lists, setting alarms, providing weather, traffic, and other real-time news information/ music playback, streaming podcasts, playing audiobooks, providing humorous jokes, play diverse games such as 20 questions]*

Website condition:

*Amazon's online website is considered one of the most [skillful/social] websites. It is designed to provide a wide array of information and services [for customers including detailed product information, one-click check-out, easy-to-use shopping cart,*

*recommendations, and many others / not only limited to searching product information and making purchases, but also other entertaining services such as music playback, streaming TV shows, and playing audiobooks].*

Six participants were individually invited to the research lab and were asked to read and follow all four versions of instructions. Once they came to the lab, the researcher reviewed the consent form with them and the participants were informed that the session would be recorded. Then, they were asked to use Amazon Echo and the Amazon website following the instructions for both socially-oriented and task-oriented interactions. Participants were instructed to spend as much time as they needed to complete the given instructions. Participants were left alone in the room with Amazon Echo and the Amazon website displayed on a computer screen. Their interactions were recorded. After they completed the interactions, a short interview was conducted to learn what they thought about the skills in the instruction sheets, whether they experienced any difficulties, and whether they had any suggestions about the procedure and instructions. The researcher also observed the time needed to complete each instruction by evaluating the recorded sessions.

Four main concerns were raised from the interviews, and each concern was addressed as follows. First, some skills were inappropriate for the experiment because they required purchasing, automatically saved previous users' history, or did not operate correctly. These skills were removed. Second, certain skills required more precise guidelines. For a few skills, Amazon Echo responded only to a very specific command (e.g., play K-Love station - play K-Love radio station). Participants found navigation on



the website for some skills was challenging, requiring a step-by-step guideline to complete those skills. These skills were revised. Third, some users persistently forgot to initiate the voice assistant with the wake-up word “Alexa”, and struggled throughout their interaction. Therefore, the basic guideline on how to use the given shopping medium was added at the beginning of the instruction. Fourth, participants reported that they felt overwhelmed when encountering the full list of skills that they had to complete in a given time. To reduce the pressure, the one-page instruction sheets were divided into three separate pages: introduction and basic guideline, five primary skills, and the rest of the remaining skills.

Additionally, the interaction time was set at 10 minutes after Pilot Study 2. Four participants who spent more than 10 minutes reported that they felt the interaction was too long. The recordings of the participants’ interactions confirmed that all participants were able to complete most skills within 10 minutes.

### **3.1.5. Instruments**

Dependent measures used in this study were evaluation of the recommended product, parasocial relationship, and perceived humanlikeness. In addition, the attitude toward the brand (i.e., Amazon) measure, a control variable, and one manipulation check item were added. Measurements were adopted from previous studies to ensure validity and reliability. To ensure reliability and validity, widely used measurements with high reliability (e.g., Cronbach’s *alpha*) and acceptable factor loadings were selected. When various measurements existed, the measurement that suited better with the current study context (i.e., persuasion of an anthropomorphized non-human agent) was selected.

**Evaluation of the recommended product.** Evaluation of the recommended product was measured using the scale published in Touré-Tillery and McGill's study (2015). This measure was used to assess consumers' product evaluation within a recommendation – acceptance context which is similar to the current study context that investigates the role of voice assistants as a salesperson.

The scale contains five items rated on a 7-point rating scale: “do you like the recommended product? (1=dislike extremely, 7=like extremely)”, “what is your impression of the recommended product? (1= very bad, 7= very good)”, “what are your thoughts on the quality of the recommended product? (1=very ineffective, and 7=very effective)”, “what is your degree of confidence that the recommended product would work as intended? (1=very doubtful, 7=very confident)”, “how likely will you buy the recommended product? (1=very unlikely and 7=very likely)”, and one open-ended item, “how much are you willing to pay for the recommended product?” for which the participants indicate the maximum price they are willing to pay for the given product. Toure-Tilley and McGill reported a Cronbach's *alpha* coefficient of 0.74 - 0.90 across three studies.

**Parasocial Relationship with the Shopping Medium.** Consumers' felt parasocial relationship with the shopping mediums was measured using the parasocial interaction scale (PSI; Rubin et al.,1985). Rubin et al.'s (1985) measurement was the first reliable, statistically validated scale comprised of 20 items. PSI is the most widely applied instrument for measuring parasocial relationships (Dibble et al., 2015). Researchers agree that PSI is effective in measuring parasocial relationships with the media character (Dibble et al., 2015; Hartmann, 2008; Hartmann & Goldhoorn, 2011).

PSI is found to be internally consistent and unidimensional (Cronbach's *alpha* coefficient of 0.93) (Rubin et al., 1985).

Although PSI was initially developed to measure elements of friendship, perceived similarity, and empathy with newscasters (Rubin et al., 1985), researchers have modified and adapted the original scale to other contexts successfully, providing support for the validity of PSI in measuring parasocial relationship in various contexts (e.g., online avatars, movie characters, politicians, and robots) (Dibble et al., 2016; Giles, 2002; Hartmann, 2008; Labrecque, 2014; Schiappa, Allen, & Gregg, 2007; Thorson & Rodgers, 2006). For example, Dibble et al. (2015) used a modified version of PSI (15 items after removing 5 items that are only applicable to newscasters) to measure a participant's felt parasocial relationship with a person in a video clip. The Cronbach's *alpha* coefficient was reported as 0.92. Similarly, Labrecque (2014) used a shortened version of PSI (selected 6 items out of 20 items) to measure a participant's felt parasocial relationship with a brand. The Cronbach's *alpha* coefficient was reported as 0.83.

Similarly, the current study adapted PSI to the context of parasocial relationships with a voice assistant and a website. Of the 20 items, 11 items were used after removing 9 items that were irrelevant to the study context (e.g., "When the newscaster joke around with one another it makes the news easier to watch", "When my favorite newscaster reports a story, he or she seems to understand the kinds of things I want to know", "If my favorite newscaster appeared on another television program, I would watch that program", "I would like to meet my favorite newscaster in person").

**Perceived humanlikeness of the shopping medium.** The perceived humanlikeness of shopping medium was measured with four items from the Bartneck et

al.'s (2009) Godspeed indices. The instrument is comprised of five semantic differential scale items that are measured on a 7-point scale, including “fake: natural”, “machinelike: humanlike”, “unconscious: conscious”, and “artificial: lifelike”. One item (i.e., “moving rigidly: moving elegantly”) was removed because neither a website nor a voice assistant can move. This scale is one of the most widely used measures to assess humanlikeness in the human-machine interactions studies (Weiss & Bartneck, 2015). Researchers reported the scale to be reliable, with a Cronbach's *alpha* coefficient ranging from 0.86 to 0.93 (Bartneck et al., 2009).

**Attitude toward Amazon.** Preexisting brand attitude can influence consumers (Phelps & Thorson, 1991). As Amazon is a well-known brand, it is possible that the outcomes are affected by participants' existing attitude toward the company. To control for the potential brand effect on the dependent measures, attitude toward Amazon was measured as a covariate.

Attitude toward Amazon was measured with five attitude items from Spears and Singh (2004). The instrument is comprised of five 7-point semantic-differential scale items, including “bad: good”, “unfavorable: favorable”, “unpleasant: pleasant”, “dislikable: likable”, and “unappealing: appealing”. This scale is one of the most widely used measures for brand attitude (Ballantine & Martin, 2005; Bojei & Hoo, 2012). Researchers reported the scale to be reliable, with a Cronbach's *alpha* coefficient of 0.98 (Spears & Singh, 2004). The measurements used in Study 1 are presented in Table 3.

Table 3  
Instruments

Variable	Instrument	Cronbach's $\alpha$	Items
Product Evaluation	Participants' attitude and behavioral intentions regarding the recommended product (Toure-Tillery & McGill, 2015)	0.74 - 0.90	1. Do you like the recommended product? (1=dislike extremely, 7=like extremely) 2. What is your impression of the recommended product? (1= very bad, 7= very good) 3. What are your thoughts on the quality of the recommended product?(1=very ineffective,7=very effective) 4. What is your degree of confidence that the recommended product would work as intended? (1=very doubtful, 7=very confident) 4. How likely will you buy the recommended product? (1=very unlikely and 7=very likely) 5. How much are you willing to pay for the recommended product (open-ended question)
Parasocial relationship with the shopping medium	Interpersonal involvement of the user with the device she uses. (Rubin, Perse, & Powell, 1985; Dibble et al., 2015)	0.83 - 0.92	1. I would like to compare my ideas with what Alexa/the Amazon website says/shows 2. Interacting with the website make me feel comfortable as if I am with friends 3. If Alexa/the Amazon website was a human, I imagine Alexa/the Amazon website as a natural down-to-earth person. 4. I would like to hear the opinion of the Alexa/ the Amazon website in my home. 5. Alexa/the Amazon website keeps me company while I use it. 6. I look forward to using Alexa/Amazon again. 7. When Alexa/the Amazon website responds to my request, it seems to understand the kinds of things I want to know. 8. If there was a story about Alexa/the Amazon website in a newspaper or magazine, I would read it. 9. I would miss using Alexa/the Amazon website when I can't use it because it needs to be repaired 10. I think Alexa/the Amazon website is like an old friend. 11. I find Alexa/the Amazon website to be attractive.
Perceived Humanlikeness of the shopping medium	Consumers' perceived humanness of a voice assistant/website (Bartneck et al., 2009)	0.86 - 0.93	The Amazon website/Alexa is... 1. Fake (1) – Natural (7) 2. Machinelike (1) – Humanlike (7) 3. Unconscious (1) – Conscious (7) 4. Artificial (1) – Lifelike (7)
Attitude toward Amazon	Consumers' attitude toward the brand (MacKenzie & Lutz, 1989)	0.98	To me, Amazon is... 1. Bad (1) – Good (7) 2. Unappealing (1) – Appealing (7) 3. Unfavorable (1) – Favorable (7) 4. Dislikeable (1) – Likable (7) 5. Unpleasant (1) – Pleasant (7)
Manipulation Questions	How would you evaluate your interaction with Alexa/Amazon? (1=socially-oriented, 7=task-oriented)		
Demographic Questions	Age, gender, ethnicity, socio economic status, history of using voice assistants		

### **3.1.6. Data Collection**

A non-probability, convenience sampling was used for the lab experiment. In order to find participants who were willing to visit the lab on campus and to represent the population of the current users of voice assistant, young adults who were between 18 and 36 years of age and those who has experience using a voice assistant, a computer, and a mobile phone were recruited from the University of Minnesota Twin Cities campus. Young adults were recruited because a recent survey showed users of voice assistants was mainly millennials (Walker Sands, 2017). Prior experience of using a voice assistant, a computer, and a mobile phone was necessary because participants were randomly assigned to one of the shopping medium type conditions.

To recruit participants, flyers were posted on bulletin boards on the Twin-Cities campus. After obtaining the consent of several instructors in the College of Design, email invitations were sent out to the students enrolled in those instructors' classes (see Appendix A for the flyer and the email). Flyers and emails included short descriptions of the study and the eligibility criteria to participate in the study (i.e., age, previous experience with a computer, a mobile phone, and a voice assistant). To avoid highlighting the nature of the study, the flyer described the study as "online shopping research."

### **3.1.7. Experimental Procedures**

Participants voluntarily responded to the recruiting email or flyers and contacted the researcher by email. They were then given a short online survey. This pre-experiment survey was to confirm their eligibility (i.e. age, experience of using voice assistant)

before inviting the participants to the lab. The survey included questions regarding their device usage frequency (computer, mobile phone, and voice assistant), ownership of the devices (whether they owned the device and how long they owned it), demographic questions (age, gender, ethnicity), and brand attitude toward Amazon and Google. Questions on mobile phone usage and Google were included to make the purpose of the study less obvious to the participants. At the end of the survey, the participants followed the link to schedule a time for the experiment using an Internet calendar ([www.doodle.com](http://www.doodle.com)).

They also received the consent form in this email, so all participants had sufficient time to review the necessary information related to the experiment before they arrived at the research lab. They were encouraged to contact the researcher if they had any questions while reviewing the consent form.

Once the participants came to the research lab individually, the researcher reviewed the consent form with the participant and obtained his/her signature. All participants were reminded of the voluntary nature of the study, their rights to stop the experiment at any time, and that their interaction/browsing behavior would be recorded for the study. After they signed the consent form, they were instructed to go to a room where the voice assistant and the computer were located.

Participants were randomly assigned to one of the four experimental conditions and given the corresponding instruction sheet. A randomization generator (<https://www.randomizer.org/>) was used to determine the condition of each participant. Thus, the researcher was not involved in selecting the subjects into a certain condition.

Once they entered the room, all participants interacted with the assigned shopping medium type (either Amazon Echo or the Amazon website) for 10 minutes following the given instruction that corresponded with their experimental condition (either socially-oriented or task-oriented interaction). The participants were told that they would first use the shopping medium for 10 minutes, then complete a survey in which they watch videos of using the shopping medium for a specific condition. To make the interactions natural and comfortable, the participants were left alone in the room while they were using Amazon Echo and the Amazon website.

While the ten-minute interaction was primarily to manipulate the interaction style, it also served a secondary purpose. Because the user-device parasocial relationship was a key interest of the current study, it was important that the participants develop a sense of relationship. Interactions, whether real (Berger & Calabrese, 1975) or imagined (Horton & Wohl, 1956; Rubin & Perse, 1987), are a precondition to relationship development. Previous studies have shown that three to five minutes of interactions with a computer or a confederate were enough to generate the effect of a relationship on a consumer's behavior (Nass & Yen, 2010). Thus, the ten-minute interaction was expected to play an important role in forming a relationship.

After ten minutes of interaction, the second part of the experiment began. The researcher entered the room with a tablet-computer which contained the shopping scenario. The scenario was presented on a separate tablet-computer instead of the computer in the room because Nass and colleagues (1994; 2000) demonstrated that participants tend to evaluate a device's performance more positively when they have prior experience of using that device.



The participants read the scenario and watched two videos in which the participants were shopping using the assigned shopping medium type. The first scenario and video showed a shopping situation of searching for the desired product information. The second scenario and video depicted the situation in which the desired product was purchased, and a recommendation appeared at the end. After participants viewed the videos, they answered a questionnaire. The questionnaire first asked the participants to recall what product was recommended, then to evaluate the recommended product. Then, they completed parasocial relationship, humanlikeness, and demographic items. Demographic information was collected to understand the general characteristics of the sample group and to ensure that the results were interpreted accordingly. Upon completion, they were debriefed of the purpose of the study and received either a ten-dollar Starbucks or Target giftcard as compensation.

## **3.2. Results**

### **3.2.1. Exploratory Data Analysis**

#### **3.2.1.1. Sample Characteristics and Preliminary Analysis**

A total of 88 participants responded to the recruiting materials. Two participants who were older than 36 were excluded through the pre-survey, and one participant who turned out to have almost no experience using voice assistants was excluded. Data from 85 participants were used for the analysis. The average age of the sample was 24.82 ( $SD=5.47$ , range= 18-36). There were 15 (17.6%) males and 70 (82.4%) females. The majority were Caucasian (56.5%), followed by Asian (31.8%). Their yearly estimated household

income varied from less than \$10,000 to \$150,000 or more. Forty-three participants (50.6%) owned a voice assistant and most of them have used it for two years or less. Those who did not own a voice assistant still indicated that they had known about voice assistants and had used them a couple of times. Table 4 describes the characteristics of the sample.

In addition, a set of ANOVA and chi-square test results indicated no significant differences among the four conditions in terms of gender ( $X^2(3, N=85) = 0.98, p=0.81$ ), age ( $F_{3, 81} = 0.87, p=0.46$ ), ethnicity ( $X^2(12, N=85) = 15.64, p=0.21$ ), income ( $X^2(33, N=85) = 32.00, p=0.52$ ), ownership of the voice assistant ( $X^2(3, N=85) = 0.51, p=0.92$ ), length of using a voice assistant ( $F_{3, 39} = 1.35, p=0.27$ ), length of using the Amazon website account ( $F_{3, 81} = 0.57, p=0.64$ ), and their attitude toward Amazon ( $F_{3, 81} = 0.72, p=0.54$ ).

Table 4  
*Participant Characteristics (Study 1)*

	<b>Characteristics</b>	<b>Participants (n=85)</b>
Age	18-36 (mean= 24.82; SD= 5.47)	
Gender	Male	15 (17.6%)
	Female	70 (82.4%)
Ethnicity	Caucasian	48 (56.5%)
	African American	4 (4.7%)
	Asian	27 (31.8%)
	Latino/Hispanic	3 (3.5%)
	Other	3 (3.5%)
Income	Less than \$10,000	14 (16.7%)
	\$10,000 to \$29,999	19 (22.4%)
	\$30,000 to \$49,999	10 (11.7%)
	\$50,000 to \$69,999	8 (9.4%)
	\$70,000 to \$89,999	13 (15.3%)
	\$90,000 to \$99,999	3 (3.5%)
	\$100,000 to \$149,999	9 (10.6%)
	\$150,000 or more	9 (10.6%)
Length of using the Amazon website	Less than 6 months	1 (1.2%)
	6 months – less than 1 year	6 (7.1%)
	1 year – less than 2 years	4 (4.7%)
	2 years – less than 3 years	17 (20.0%)
	3 years – less than 5 years	25 (29.4%)
	Over 5 years	32 (37.6%)
Own a Voice Assistant	Yes	43 (50.6%)
	No	42 (49.4%)
Length of Voice Assistant ownership (n=43)	Less than 6 months	17 (39.5%)
	6 months – less than 1 year	13 (30.2%)
	1 year – less than 2 years	11 (25.6%)
	Over 2 years	2 (4.6%)

### 3.2.1.2. Measurement Reliability and Validity

Reliability and validity of the scales were tested through a factor analysis. A factor analysis was conducted applying Maximum Likelihood (ML) estimation for extraction and direct Oblimin rotation. Only items with a factor loading over 0.40 were selected because previous studies suggested factor loading to be at least 0.40 or greater (Matsunaga, 2010). Cronbach's *alpha* coefficients of constructs were estimated to check

the internal consistency of each variable. A Cronbach's *alpha* coefficient value of over 0.70 was determined as acceptable (Hinton, Browlow, McMurray, & Cozens, 2004)

The factor analysis results are presented in Table 5. The majority of the items were loaded on the desired factor, confirming the discriminant validity of measures. For perceived humanlikeness, one item (i.e., unconscious: conscious) was removed because the factor loading was lower than 0.40 which makes its value in a factor to be questionable (Child, 2006). The reliability of the perceived humanlikeness after removing this item was 0.88 (Cronbach's *alpha* coefficient).

Two items from the adapted PSI were removed (i.e., "If there were a story about Alexa/the Amazon website in a newspaper or magazine, I would read it", "I find Alexa/the Amazon website to be attractive") because of low factor loadings (< 0.40). The Cronbach's *alpha* coefficient of the scale after removing the two items was 0.88.

For product evaluation, one item was removed (e.g., "how much are you willing to pay for the recommended product?") because the factor loading was lower than 0.40. The Cronbach's *alpha* coefficient of the product evaluation after removing this item was 0.87. The measurement scores were averaged to create indices for further analyses.

Table 5  
*Factor Analysis Results (Study 2)*

Item	Factor loading			Factor loading (final)		
	1	2	3	1	2	3
<b>Humanlikeness 1</b> (Fake – Natural)	0.12	0.14	<b>-0.73</b>	0.10	0.14	<b>-0.72</b>
<b>Humanlikeness 2</b> (Machinelike – Humanlike)	0.18	-0.06	<b>-0.75</b>	0.13	-0.04	<b>-0.78</b>
<b>Humanlikeness 3</b> (Unconscious – Conscious) <sup>a</sup>	0.28	0.18	<b>-0.10</b>	-	-	-
<b>Humanlikeness 4</b> (Artificial – Lifelike)	0.13	0.01	<b>-0.79</b>	0.06	0.03	<b>-0.83</b>
<b>Parasocial 1</b> (I like to compare my ideas with what Alexa/the Amazon website says/shows)	<b>0.62</b>	0.06	0.22	<b>0.63</b>	0.05	0.22
<b>Parasocial 2</b> (Talking to Alexa/Using the Amazon website make me feel comfortable as if I am with friends)	<b>0.62</b>	0.08	-0.24	<b>0.58</b>	0.10	-0.28
<b>Parasocial 3</b> (If Alexa/the Amazon website were humans, I imagine Alexa/the Amazon website as a natural, down-to-earth person)	<b>0.59</b>	-0.13	-0.21	<b>0.58</b>	-0.15	-0.24
<b>Parasocial 4</b> (I like hearing the voice of Alexa/browsing the Amazon website in my home)	<b>0.70</b>	0.01	0.04	<b>0.70</b>	0.01	0.02
<b>Parasocial 5</b> (Alexa/the Amazon website keeps me company while I use it.	<b>0.69</b>	-0.01	0.01	<b>0.61</b>	0.02	-0.06
<b>Parasocial 6</b> (I look forward to using Alexa/the Amazon website again)	<b>0.63</b>	0.04	-0.06	<b>0.61</b>	0.04	-0.08
<b>Parasocial 7</b> (When Alexa/the Amazon website responds to my request, it seems to understand the kinds of things I want to know)	<b>0.63</b>	0.00	-0.16	<b>0.60</b>	0.02	-0.19
<b>Parasocial 8</b> (If there were a story about Alexa/the Amazon website in a newspaper or magazine, I would read it) <sup>a</sup>	<b>0.38</b>	-0.05	-0.05	-	-	-
<b>Parasocial 9</b> (I would miss using Alexa/the Amazon website when I can't use it because it needs to be repaired)	<b>0.49</b>	0.11	-0.08	<b>0.52</b>	0.08	-0.06
<b>Parasocial 10</b> (I think Alexa/the Amazon website is like an old friend)	<b>0.72</b>	0.00	-0.06	<b>0.69</b>	-0.01	-0.10
<b>Parasocial 11</b> (I find Alexa/the Amazon website to be attractive) <sup>a</sup>	<b>0.29</b>	0.31	-0.25			
<b>Evaluation 1</b> (Do you like the recommended product?)	-0.11	<b>0.84</b>	-0.19	-0.11	<b>0.87</b>	-0.14
<b>Evaluation 2</b> (What is your impression of the recommended product?)	0.06	<b>0.67</b>	0.04	0.05	<b>0.70</b>	0.06
<b>Evaluation 3</b> (What are your thoughts on the quality of the product?)	0.06	<b>0.81</b>	0.02	0.08	<b>0.78</b>	0.07
<b>Evaluation 4</b> (What is your degree of confidence that the recommended product would work as intended?)	0.06	<b>0.71</b>	-0.01	0.06	<b>0.70</b>	0.03
<b>Evaluation 5</b> (How likely are you to buy the recommended product?)	-0.01	<b>0.76</b>	-0.10	-0.02	<b>0.76</b>	-0.07
<b>Evaluation 6</b> (How much are you willing to pay for the recommended product?) <sup>a</sup>	0.00	<b>0.36</b>	0.17	-	-	-
Eigenvalue	6.92	2.46	0.90	6.21	2.31	0.90
Variance Explained (%)	32.95	11.71	4.31	36.50	13.58	5.29
Cumulative (%)			48.97			55.36

Note. a. The item was deleted due to validity issue.  
The result was obtained using Principle Component Analysis and Direct Oblimin rotation.

### 3.2.1.3. Manipulation check

In Study 1, the participants were randomly assigned to one of four conditions (shopping medium type: voice assistant vs. website x interaction type: task-oriented vs. socially oriented). A 2-way ANOVA was conducted to check the manipulation of interaction style. The test result showed the interaction style manipulation was successful, indicating task-oriented condition participants reported their interaction to be more task-oriented and socially-oriented condition participants reported their interaction to be more socially-oriented ( $F_{1,84}=11.75, p=0.001$ ). The interaction effect of shopping medium type and interaction style was not statistically significant ( $F_{1,84}=1.73, p=0.19$ ). Thus, there was no unintended interaction effect of interaction style manipulation with the shopping medium types (see Table 6).

Table 6  
*Manipulation Check ANOVA Results (Study 1)*

Independent Variable	df	df error	F	Condition	Mean	SD	95% Confidence Interval	
							Lower Bound	Upper Bound
Interaction Type	1	84	11.75	Voice Assistant -Task	5.76	0.33	5.10	6.43
				Voice Assistant -Social	4.19	0.33	3.53	4.85
				Website -Task	5.38	0.33	4.72	6.04
				Website - Social	4.68	0.32	4.03	5.33

Cell size of interaction style manipulation was socially-oriented = 43, task-oriented = 42

Cell size of shopping medium type manipulation was voice assistant = 42, website = 43

### 3.2.1.4. Correlation analysis

Before starting the analysis, a correlation analysis between dependent measures was conducted to check for multicollinearity. Although the dependent variables are expected to be moderately related, a correlation of over 0.85 suggests a possibility of

multicollinearity (Schroeder, 1990). The results indicated that perceived humanlikeness, parasocial relationship, and product evaluation were moderately correlated (0.21~0.62).

See Table 7 for details.

Table 7  
*Correlations Between Perceived Humanlikeness, Parasocial Relationship, Product Evaluation measures (Study 1)*

	Perceived Humanlikeness	Parasocial Relationship	Product Evaluation
Perceived Humanlikeness	1		
Parasocial Relationship	0.62**	1	
Product Evaluation	0.21*	0.40**	1

Note. N=85, \*p<.05, \*\*p<.01, \*\*\*p<.001

### 3.2.2. Hypothesis Testing

#### 3.2.2.1. Main Effect of Shopping Medium Type

A MANCOVA was conducted to test the hypotheses. The Levene's test of equality of error variances was not statistically significant for perceived humanlikeness, parasocial relationship, and product evaluation ( $p > 0.05$ ), indicating that homogeneity of variance assumption was satisfied.

The multivariate test results showed a significant effect of shopping medium type (Wilks'  $Lambda = 0.84$ ,  $F_{3, 78} = 5.14$ ,  $p = 0.003$ , partial  $\eta^2 = 0.17$ ) on perceived humanlikeness, parasocial relationship, and product evaluation (see Table 8 and Table 9 for details). A follow-up ANCOVA analysis reported a significant difference between the voice assistant and the website on perceived humanlikeness ( $F_{1, 84} = 4.23$ ,  $p = 0.04$ , partial  $\eta^2 = 0.05$ ). However, the website was perceived as more humanlike than the voice

assistant ( $M_{\text{web}}=4.14$ ,  $M_{\text{voice}}=3.51$ ). Therefore, Hypothesis 1 that proposed consumers to perceive the voice assistant to be more humanlike than the website was not supported.

Hypothesis 2 proposed that consumers form a stronger parasocial relationship with the voice assistant than with the website. An ANCOVA analysis reported a significant difference between the voice assistant and the website on the degree of parasocial relationship ( $F_{1,84}=7.61$ ,  $p=0.007$ , partial  $\eta^2 = 0.09$ ), but the participants formed a stronger parasocial relationship with the website than with the voice assistant ( $M_{\text{web}}=4.97$ ,  $M_{\text{voice}}=4.26$ ). Thus, Hypothesis 2 was not supported.

Similarly, Hypothesis 3 that proposed consumers to evaluate a product recommended by a voice assistant more positively than when it is recommended on a website was not supported. An ANCOVA analysis reported the participants in the website condition evaluated the recommended product more positively than those in the voice assistant condition ( $F_{1,84}=11.36$ ,  $p=0.001$ , partial  $\eta^2 = 0.12$ ;  $M_{\text{web}}=5.32$ ,  $M_{\text{voice}}=4.56$ ).



Table 8  
*Multivariate and Univariate Analyses of Covariance for Perceived Humanlikeness, Parasocial Relationship, and Product Evaluation (Study 1)*

Source	DV	MANCOVA				ANCOVA		
		Wilk's $\lambda$	$F_{3,78}$	$p$	Partial $\eta^2$	$F_{1,84}$	$p$	Partial $\eta^2$
Attitude toward Amazon (covariate)	Perceived Humanlikeness	0.90	2.87	0.04	0.10	3.98	0.05	0.05
	Parasocial Relationship					8.02	0.01	0.09
	Product Evaluation					2.07	0.15	0.03
Shopping Medium Type	Perceived Humanlikeness	0.84	5.14	0.003	0.17	4.23	0.04	0.05
	Parasocial Relationship					7.1	0.01	0.09
	Product Evaluation					11.36	0.001	0.12
Interaction Style	Perceived Humanlikeness	0.96	1.23	0.30	0.05	0.61	0.44	0.01
	Parasocial Relationship					1.27	0.26	0.02
	Product Evaluation					3.25	0.08	0.04
Shopping Medium Type x Interaction Style	Perceived Humanlikeness	0.99	0.33	0.80	0.01	0.58	0.45	0.01
	Parasocial Relationship					0.01	0.93	0.00
	Product Evaluation					0.02	0.88	0.00

*Note.* ANCOVA = univariate analysis of covariance; MANCOVA = multivariate analysis of covariance.

Table 9  
*Mean Scores and Confidence Interval for the Perceived Humanlikeness, Parasocial Relationship and Product Evaluation by Shopping Medium Type (Study 1)*

Device	Perceived Humanlikeness		Parasocial Relationship		Product Evaluation	
	Task-oriented	Socially-oriented	Task-oriented	Socially-oriented	Task-oriented	Socially-oriented
Voice Assistant	3.55 [3.02; 4.09]	3.55 [3.01; 4.08]	4.45 [4.01; 4.88]	4.18 [3.74; 4.62]	4.76 [4.34; 5.18]	4.41 [3.99; 4.83]
Website	4.31 [3.77; 4.85]	3.90 [3.38; 4.42]	5.04 [4.60; 5.48]	4.81 [4.38; 5.24]	5.50 [5.08; 5.92]	5.09 [4.69; 5.50]

*Note.* Numbers inside the bracket indicate the 95% confidence interval

### 3.2.2.2. Mediation Analyses

A mediation analysis was conducted using the Haye's PROCESS path-analysis macro for SPSS (Hayes, 2008; Model 6) to test Hypothesis 4. Model 6 tests the mediation of two variables by estimating whether the two mediators are correlated even after accounting for the shared cause, the independent variable (Hayes, 2013). This model investigates the direct and thee indirect effects of the independent variable (i.e., shopping medium type) on the dependent variable (i.e., product evaluation). Primarily, the model tests the indirect effect with two mediators (i.e., shopping medium type → perceived humanlikeness → parasocial relationship → product evaluation). Additionally, the model also tests two indirect effects with only one mediator in each model (i.e., shopping medium type → perceived humanlikeness → product evaluation; shopping medium type → parasocial relationship → product evaluation).

One of the advantages of Model 6 is that it allows the researchers to estimate all mediation path coefficients in the causal sequence. For example, the relationship between the prior mediator (e.g., mediator 1) and the later variables (e.g., mediator 2 and dependent variable) is also estimated, which provides insights on how the variables are related to each other (Hayes, 2013). Therefore, the model estimates not only the sequential mediation of two mediators but also two single-mediator mediation models.

Mediation analysis was expected to reveal the sequential mediation process in which perceived humanlikeness and parasocial relationship together mediates the relationship between shopping medium type and product evaluation. The 95% confidence interval of the indirect effects was obtained with 5000 bootstrap resamples (Preacher & Hayes, 2008) (See Table 10, Table 11 for details). After controlling for the participants'

attitude toward Amazon, the indirect effect of shopping medium type on product evaluation through both perceived humanlikeness and the parasocial relationship was statistically significant with a point estimate of 0.08. The 95% bias confidence interval did not include zero (95% CI=[0.0006, 0.262]). All paths in the model, including shopping medium type to perceived humanlikeness ( $\beta = 0.55$ ,  $t(82)=2.04$ ,  $p=0.04$ ), perceived humanlikeness to parasocial relationship ( $\beta = 0.46$ ,  $t(81)=6.01$ ,  $p=0.000$ ), and parasocial relationship to product evaluation ( $\beta = 0.34$ ,  $t(80)=2.75$ ,  $p=0.01$ ) were statistically significant. The direct effect of shopping medium type on product evaluation was still significant ( $\beta=0.70$ ,  $t(82)=3.31$ ,  $p=0.001$  to  $\beta=0.55$ ,  $t(80)=2.53$ ,  $p=0.013$ ) when controlling for perceived humanlikeness and parasocial relationship. Therefore, the results indicated partial mediation of the two mediators. No other indirect effects were significant (Figure 3 displays the results).

The mediation analysis result supported the hypothesized mediation process (i.e., participants develop a stronger parasocial relationship with a shopping medium they perceive as more humanlike, and thus are more persuaded by it). Therefore, Hypothesis 4 was supported.

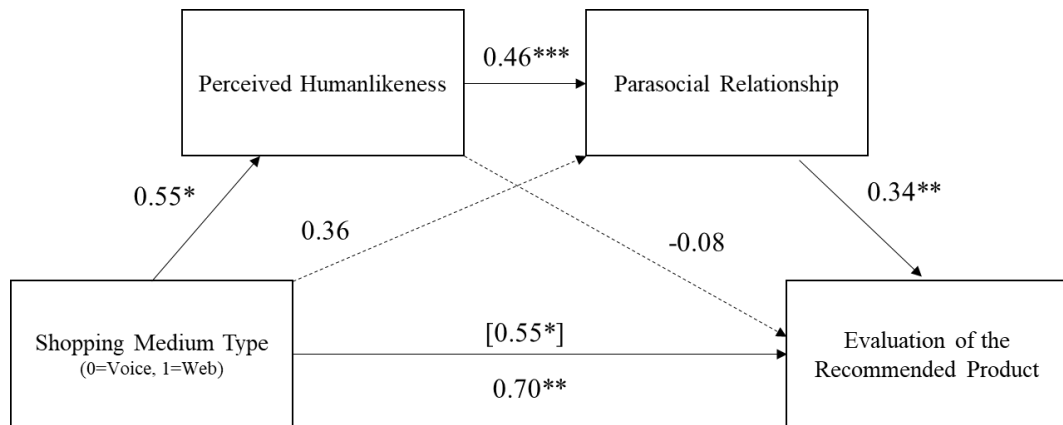


Figure 3. Direct and sequential mediation model with path coefficients (Study 1)

Note: The model was significant  $F(4, 80)=6.14, p=0002$ . \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ . The number inside the bracket is the weight for the direct path between shopping medium type and evaluation of the recommended product. The solid lines represent statistically significant effects and the dotted lines represent statistically insignificant effects.

Table 10  
Mediation Analysis and Regression Results of Shopping Medium Type on Product Evaluation via Mediators (Study 1)

Dependent Antecedent	Indirect Paths											
	Perceived Humanlikeness( $M_1$ )				Parasocial Relationship ( $M_2$ )				Product Evaluation			
	Coeff.	SE	$t$	$p$	Coeff.	SE	$t$	$p$	Coeff.	SE	$t$	$p$
Shopping Medium Type	0.55	0.27	2.04	0.04	0.36	0.19	1.88	0.06	0.55	0.22	2.53	0.01
									[0.70]	[0.21]	[3.31]	[0.001]
( $M_1$ ) Perceived Humanlikeness	-	-	-	-	0.46	0.08	6.01	0.00	-0.08	0.10	-0.83	0.41
( $M_2$ ) Parasocial Relationship	-	-	-	-	-	-	-	-	0.34	0.12	2.75	0.007
Constant	1.45	0.81	1.78	0.08	1.24	0.57	2.19	0.03	3.12	0.63	4.97	0.00
									[2.96]	[0.65]	[4.59]	[0.00]
Attitude toward Amazon (Covariate)	0.26	0.13	2.05	0.04	0.19	0.09	2.06	0.04	0.07	0.10	0.71	0.48
									[0.16]	[0.10]	[1.53]	[0.13]

\*Note: numbers indicated in the parentheses refers to the direct effect of shopping medium type on product evaluation. Shopping Medium Type: 0=Voice assistant, 1= Website

Table 11

*Indirect Effects of Shopping Medium Type on Product Evaluation via Mediators (Study 1)*

Indirect Effects	Effect	Boot SE	95% Confidence Interval LL	Interval UL
Shopping Medium Type → Perceived Humanlikeness → Parasocial Relationship → Product Evaluation	0.09	0.07	0.0006	0.262
Shopping Medium Type → Perceived Humanlikeness → Product Evaluation	0.12	0.08	-0.020	0.289
Shopping Medium Type → Parasocial Relationship → Product Evaluation	-0.05	0.08	-0.245	0.099

### 3.2.2.3. Moderating Effect of Interaction Style

The multivariate result showed no statistically significant two-way interaction effect of shopping medium type and interaction style on perceived humanlikeness, parasocial relationship, and product evaluation (Wilks' *Lambda* = 0.99,  $F_{3, 78}=0.33$ ,  $p=0.80$ , partial  $\eta^2=0.01$ ). The main effect of interaction style was not statistically significant (Wilks' *Lambda* = 0.96,  $F_{3, 78}=1.23$ ,  $p=0.30$ , partial  $\eta^2=0.05$ ) (See Table 8 for details). Therefore, Hypothesis 5-1 that proposed interaction style to exaggerate the effect of voice assistant on product evaluation was not supported. The result supported Hypothesis 5-2 that proposed no moderating effect of interaction style for the website condition.

### 3.3. Discussion

Study 1 aimed to investigate whether consumers evaluate the product recommended by a voice assistant more positively than websites because they develop a stronger parasocial relationship with a voice assistant. It was expected that people would form a stronger bond with a voice assistant because it is more humanlike than a website.

The predictions were made based on the parasocial interaction theory (Horton & Wohl, 1956; Hartmann, 2008) and anthropomorphism literature (Lee et al., 2005).

Unexpectedly, participants who interacted with the website perceived the shopping medium to be more humanlike than those who interacted with the voice assistant.

Consequently, the website users developed a stronger parasocial relationship with the shopping medium than with the voice assistant users.

While the result contradicted the prediction, the Study 1 results supported the proposed relationship in that consumers formed a stronger parasocial relationship with a more humanlike shopping medium and thus were persuaded more by it. Specifically, the findings that showed participants to develop a stronger parasocial relationship with a more humanlike shopping medium was in line with the parasocial relationship literature (Lee et al., 2005; Liebers & Schramm, 2017). For example, Lee et al. (2005) demonstrated that users formed a stronger parasocial relationship with a learning robot pet that was perceived as real and present. Liebers and Schramm (2017) also reported that perceiving a fictional character to be closer to a real person predicted a stronger parasocial relationship.

Further, the results that showed participants to positively evaluate a product recommended by the shopping medium they developed a closer relationship with was also consistent with the existing literature. Researchers have repeatedly reported that consumers were persuaded more by an agent they form a stronger parasocial relationship with (Lim & Kim, 2011; Morgan & Hunt, 1994; Park & Lennon, 2004; Park & Lennon, 2006). For example, Lim and Kim (2011) reported that a stronger parasocial relationship with the TV shopping host predicted increased satisfaction in TV shopping. Park and

Lennon (2004) also reported that a stronger parasocial relationship with the TV shopping host predicted impulse buying from the TV shopping channel.

This opposite finding (i.e., the website being perceived as more humanlike than the voice assistant) may be explained by the existing relationship consumers had with the Amazon website compared to Amazon Echo. Participants' long-term relationship with the Amazon website could have encouraged them to see the website as a representative face of the company rather than a shopping medium. While there was no empirical evidence to support this reasoning, anecdotal evidence suggested this possibility. The researcher briefly talked to the participants as they finished the sessions about their experiences. In the conversations the researcher had with the participants, the participants in the website condition often mentioned their trusting relationship with Amazon above and beyond the website itself. The participants in the voice assistant condition, on the other hand, were very much focused on the voice assistant, Alexa.

Although both shopping mediums are operated by Amazon, the website may be evaluated as more humanlike than the voice assistant because of the longer history of using the Amazon websites compared to Amazon Echo. Previous studies reported consumers to form an impression of the brand based on various inputs including distribution channels, organizational values, employee behavior, marketing mix, and values (Aaker, 1997; Portal, Abratt, & Bendixen, 2018). Because participants had more experience with using the Amazon websites, they were more likely to have interacted with various sources related to the website such as the customer service staffs, sellers on the website, other consumers using the Amazon websites, and product review videos posted on websites. Thus, these experiences could have led the participants to recall more

human resources related to the website, resulting in an enhanced humanlikeness perception of the website compared to the voice assistant.

The result showed that the interaction style did not moderate the effects of shopping medium, which could be due to two reasons. First, the participants' long history of using the Amazon website could have contributed to the insignificant results. If participants had already formed a strong opinion toward the Amazon website and the way the company interacts with the customers, their opinion could not have easily been changed based on a short, 10-minute interaction. Second, the way participants interacted with a non-human agent may be inherently non-social compared to a real human-to-human interaction. There are a limited set of interactions users can make using a computer or a voice assistant, such as searching for a piece of information, ordering products, and playing music. These skills can barely have the similar degree of socialness found in human-to-human interaction. The small mean difference between socially-oriented interaction and task-oriented interaction suggest this possibility. Thus, even when the manipulation of the interaction style was significant, this small gap between the task-oriented interaction and socially-oriented interaction might have been too weak to produce an effect.

Overall, the results suggest that a further investigation is needed because the findings could have been strongly influenced by the participants' prior experience with the Amazon website. Therefore, Study 2 was designed to test the hypotheses using a hypothetical retailer's website and voice assistant to eliminate the effect of existing relationships.



### **3.4. Follow-up Study: Humanlikeness of Voice Assistant and Website**

Because Study 1 results contradicted the main premise of the study that voice assistants would be more humanlike than websites, a follow-up study was conducted to test this assumption. In addition, because previous studies had reported people to perceive computers as social actors (Nass, Moon, & Green, 1997; Nass & Yen, 2010; Reeves & Nass, 1996), the follow-up study also examined people's humanlikeness perception of computers. This was to investigate whether people perceived websites to be more humanlike than voice assistants because they perceived computers, in which the websites were presented, to be more humanlike.

A short survey was conducted to understand how participants evaluate the humanlikeness of a voice assistant, a website, and a computer in general. Forty participants were recruited through Amazon MTurk for 30 cents. Participants were instructed to evaluate humanlikeness of a voice assistant, a website, and a computer respectively using four semantic-differential scale items from Bartneck et al.'s (2007) Godspeed indices on a 7-point scale. There was no specific brand or a retailer that the participants were asked to imagine. A voice assistant, a website, and a computer were presented in a random order.

The mean age of the participants was 37.13 (range 20 to 52) and was consisted of 17 males (42.5%) and 23 females (57.5%). A principle component analysis was conducted, which showed all four items to be loaded on one factor with Cronbach's *alpha* coefficient of 0.86. The four items were averaged and was used as a humanlikeness index (See Table 12).

The result of ANOVA showed that there was a statistically significant difference across a voice assistant, a website, and a computer in perceived humanlikeness ( $F_{2, 117}=4.82, p=0.01, \text{partial } \eta^2=0.08$ ). The post-hoc analysis (i.e., Duncan test) confirmed that a voice assistant was perceived as more humanlike than a website and a computer. There was no statistically significant difference between a website and a computer on perceived humanlikeness (see Table 13).

Table 12  
*Factor Analysis Results for 4 items of Perceived Humanlikeness*

Item	Factor	$h^*$
<b>Bartneck et al. (2009) Godspeed Indices</b> (Cronbach's $\alpha = 0.84$ )		
<i>I would describe a "voice assistant/computer/laptop" as...</i>		
Mechanic : Humanlike	0.79	0.62
Unconscious : Conscious	0.87	0.75
Artificial : Lifelike	0.85	0.72
Fake : Natural	0.85	0.72
Eigenvalue	2.81	
Variance Explained (%)	0.32	

Note.  $h^*$ : communality.

The result was obtained using principle component analysis and Varimax rotation

Table 13  
*Mean Scores of a Voice Assistant, a Website, and a Computer on Perceived Humanlikeness*

Dependent Variable	df	df error	$F$	$p$	Condition	Mean	95% Confidence Interval	
							Lower Bound	Upper Bound
Perceived Humanlikeness	1	117	4.82	0.01	Voice Assistant	3.45 <sub>a</sub>	2.99	3.91
					Website	2.49 <sub>b</sub>	2.03	2.95
					Computer	2.66 <sub>b</sub>	2.20	3.12

Note. The subscripts are used to indicate which groups are statistically significant from each other based on the Duncan test. The means with different letter subscripts indicates a statistically significant mean difference whereas the means with the same letter subscripts indicate no statistically significant mean difference exists.

Therefore, the assumption that a voice assistant was perceived as more humanlike than a website was confirmed. Also, the results indicated perceived humanlikeness of a website was not different from perceived humanlikeness of a computer, suggesting that the results were less likely to be due to comparing a voice assistant to a website operated on a computer.

## **CHAPTER 4**

### **STUDY 2**

This chapter presents the methods – experiment design, stimuli development, instruments, data collection, and study procedure - results, and discussion for Study 2.

#### **4.1. Methods**

##### **4.1.1. The Objective of the Study and Study Design**

The purpose of Study 2 was to test the shopping medium type effect on consumers' evaluation of the recommended item using a hypothetical retailer. Additionally, this study aimed to identify the condition under which the shopping medium type effect was more prominent than others by investigating the interaction with product type (H6). This study employed a two (shopping medium type: voice assistant vs. website) by two (product type: search product vs. experience product) between-subjects factorial design experiment.

##### **4.1.2. Stimuli Development**

###### **4.1.2.1. Manipulation of Shopping Medium Type**

As in Study 1, two different mediums of online shopping, a voice assistant and a website, were used. Similar to Study 1, videos depicting a shopping situation were developed. Unlike Study 1, a fictitious voice assistant and website from a hypothetical retailer, AROA, were created to eliminate any effect of preexisting consumer-brand

relationships. To minimize the participants' uncertainty and risk perception of the unknown brand, AROA was introduced to the participants as a large, global retailer.

*AROA is [a voice assistant owned by/a website of] the AROA Inc., a 40-years old international retail corporation that operates a chain of hypermarkets, discount department stores, and grocery stores. As of 2018, AROA Inc. has 11,718 stores and clubs in 28 countries, operating under 59 different names.*

A video for voice shopping was created using a Bluetooth speaker without any brand logo. The video of the speaker was edited to simulate how other voice assistants like Amazon Echo signal users that they are activated. Amazon Echo's vocal responses were recorded and added to the Bluetooth speaker video.

A video of shopping on AROA website was created using Microsoft PowerPoint. The website was designed based on popular retailers' websites, such as Target, Walmart, Amazon, and JC Penney (see Figure 4). As in Study 1, the shopper's information (e.g., body, hands, voice) was not revealed in the videos.

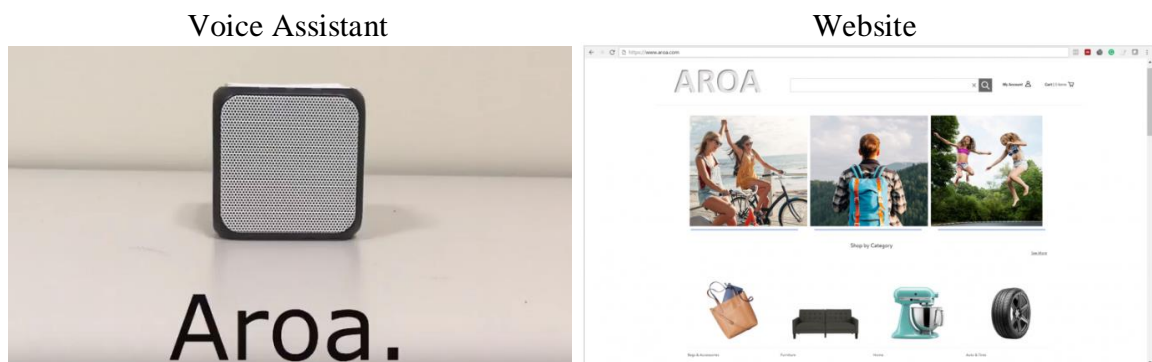


Figure 4. Screenshots of the shopping medium used in the videos (Study 2).

The shopping medium type was manipulated using videos. Because the participants were new to AROA, three videos depicting different situations of users interacting with AROA were developed to introduce the voice assistant or the website to the participants. The videos were intended to show how the voice assistant or the website functions and interacts with consumers. To make the participants indirectly experience the way consumers would interact with AROA, three pairs of short videos of a user interacting with AROA were developed. The three pairs of videos showed a consumer asking for a recommendation for gifts for (a) mom/(b) dad, searching today's deals for (a) home necessities and garden/(b) outdoors and sports, and playing music for (a) brain power/(b) relaxation using either the voice assistant or the website. Thus, a total of 12 videos (six per shopping medium type) were created. Each pair of videos contained almost identical content to control the information the participants gain through the interaction phrase (the interaction video screenshots are provided in Appendix B). For example, on the first trial interaction, a participant was asked to choose between (a) "gifts for mom" and (b) "gifts for dad." Depending on the participant's choice, the voice assistant then said "*Every [Dad/Mom] is different. Some might like a colorful new pair of socks. Others might want to play mini golf with the family. Some may just want to watch TV. See today's deals for inspiration.*"

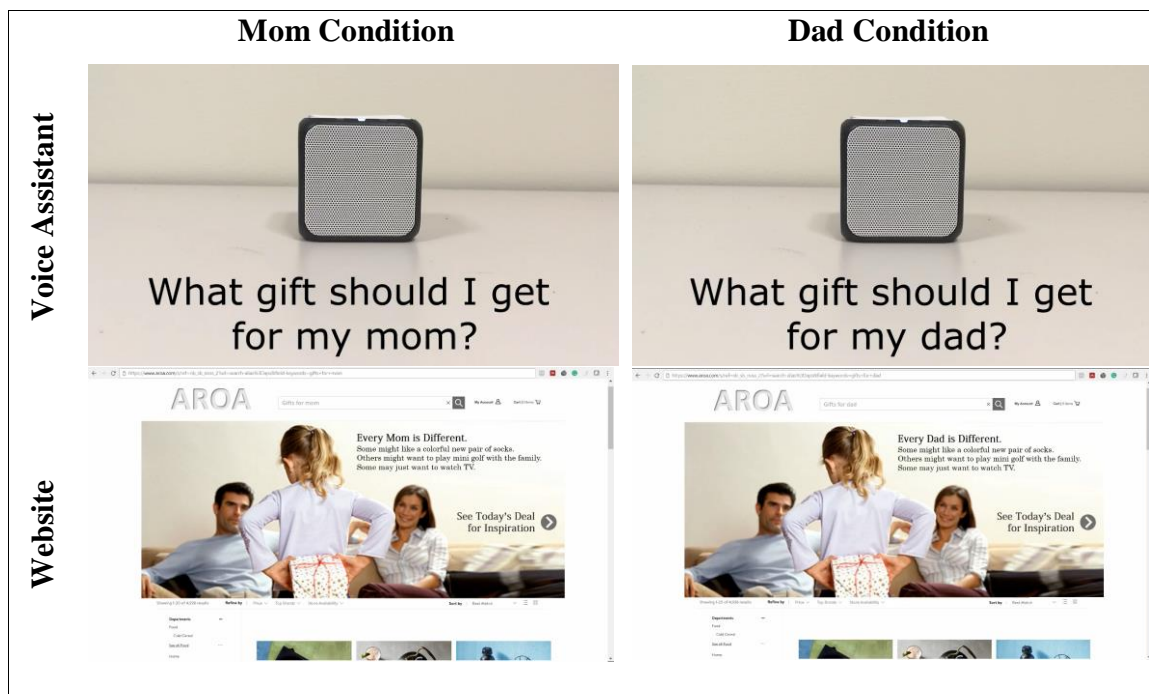


Figure 5. Trial interaction 1 videos screenshots (Study 2).

To increase the sense of interaction, the participants were asked to imagine themselves as the shopper in the video and to select the option they would like to ask AROA between two options. They repeated this interaction exercise three times. The repetition of different commands was intended to familiarize the participants with the shopping medium and to expose them to a range of skills that the shopping medium was capable of.

After the three interaction videos, the participants were asked to imagine searching for a beach mat using the assigned shopping medium type (AROA voice assistant or AROA website). Two sequential videos that simulated the beach mat shopping process were shown to the participants. In the first video, a shopper either asked AROA voice assistant to search for a beach mat or typed the command in the search bar

on AROA website. The shopping medium presented three beach mat products as a result of the search. The first video was presented with a written scenario:

*It was one of your typical days. Your friend called you in the evening and asked whether you wanted to go to the beach next weekend. You agreed to and started to think about what to bring to the beach.*

*While going through your closet, you realized that your "**Beach Mat**" was too sticky and rusty from last year's beach party. You decided to order a new "**Beach Mat**" right away so that you don't forget to buy them later this week. You decided to purchase the **Beach Mat** using a [**Voice Assistant (AROA)/Website (AROA)**] you have at home.*

Then, the participants were told that they had selected one of the three products and placed an order. The second video showed the shopper receiving a recommendation of a product (i.e., add-on product) that was frequently bought together with the product being purchased. This video was presented after the written scenario:

*You did some more research on [**this Voice Assistant/this Website**], but in the end, decided to purchase the product that you initially had in mind. As you are purchasing the product, you receive the following recommendation.*



#### **4.1.2.2. Manipulation of Product Type**

The product type was manipulated by giving either a search product or an experience product as a recommendation. In the past, researchers have determined a product's search/experience qualities by whether consumers need to directly experience a product in order to evaluate it (Nelson, 1970; Senecal & Nantel, 2004; Weathers et al., 2007). Products that can be evaluated prior to purchase by reading the product information provided by retailers or manufacturers were classified as search products (Weathers et al., 2007). Products that could only be evaluated after the purchase by directly touching, seeing, or hearing the products were classified as experience products (Weathers et al., 2007). Products can have more or less search qualities or experience qualities and these qualities were used to determine the type of products in previous studies (Luan, Yao, Zhao, & Liu, 2016; Nelson, 1970; Ochi, Rao, Takayama, & Nass, 2010; Senecal & Nantel, 2004; Srinivasan & Till, 2002; Weathers, Sharma, & Wood, 2007). The same classification was used to select a search product and an experience product for this study. Pilot study 3 was conducted to select the appropriate items to be used as a recommendation.

#### **4.1.3. Pilot Study 3: Selection of Search and Experience Product**

The purpose of Pilot Study 3 was to select a search product and an experience product for Study 2. Only the products that were relatable to beach mats were considered because the recommendations were add-on products for a beach mat. A list of beach mat-related products was first obtained by observing product recommendations on

commercial websites (e.g., Amazon, Target, and Walmart) when shopping for beach mats. Eight different beach-related products (a sunscreen, a beach towel, an SPF lip balm, an insect repellent spray, a waterproof cellphone case, a beach ball, an after-sun care product, and a swimming goggle) were selected.

A product's experience qualities and search qualities were determined by using five items from the Weathers, Sharma, and Wood's (2007) study. Three items assessed experience qualities (i.e., "It's important for me to (1) see/(2) touch/(3) hear this product to evaluate how well it will perform") and two items assessed search qualities (i.e., "I can adequately evaluate this product using only information provided by the retailer or manufacturer about the product's attribute and features", "I can evaluate the quality of this product simply by reading information about the product"). According to Weathers et al.'s (2007) instruction, a product's search/experience quality index was calculated by subtracting the mean of the two search qualities items from the mean of the three experience qualities items. A positive score suggested that a product possessed more experience qualities while a negative score indicated a product possessed more search qualities.

An online survey was conducted to assess the eight products' search/experience qualities. Forty participants were recruited through Amazon MTurk for 50 cents. The participants viewed all eight products in a randomized order. They evaluated each product on five search/experience qualities items, and the item's fit with a beach mat (i.e., "Do you think this product is a good recommendation for a consumer purchasing a beach mat?").

Additionally, variables that may confound the manipulation were also measured. Participants were asked to indicate their knowledge, purchase regularity, and the importance of the product in general (i.e., “I am very knowledgeable about this product”, “I purchase this product regularly”, “To me, this product is important”). Consumer’s knowledge (Senecal & Nantel, 2004; Weathers et al., 2007), likelihood to purchase, and importance to self (Weathers et al., 2007) were commonly measured variables to control for unintended product effects. All items were measured on a 7-point Likert scale.

The mean age of the participants was 37.83 (range 20 to 57) and consisted of 17 males (42.5%) and 23 females (57.5%). The principle component analysis with Varimax rotation was conducted to confirm the items represented two principle components, the search qualities and experience qualities. (See Table 14 for details). One item was removed (e.g., “it is important for me to hear this product to evaluate how well it will perform”) because its factor loading was lower than 0.40. This result was understandable because the eight products in the study were irrelevant to sound performance. The remaining four items were used to calculate the search/experience qualities index following Weathers et al.’s (2007) study.

The results showed the eight products significantly varied in their search/experience qualities ( $F_{7, 312}=5.24, p=.000$ ). The post-hoc analyses (i.e., Duncan test) showed sunscreens ( $M= -1.61, SD=2.30$ ), SPF lip balms ( $M= -1.98, SD=2.39$ ), insect repellent sprays ( $M= -1.64, SD=2.36$ ), and after-sun care products ( $M= -1.69, SD=2.60$ ) to belong to the highest index scores group indicating that this have more search qualities while beach towel ( $M= 0.05, SD=2.09$ ) and swimming goggles ( $M=$

0.11,  $SD=2.25$ ) belong to the lowest index scores group indicating more experience qualities.

Among the eight products, the sunscreen was selected as the experience product and the beach towel was selected as the search product because the two products significantly differed in search/experience qualities but did not show a statistically significant difference on any of the potential confounding variables. A MANOVA and post-hoc analyses (i.e. Duncan test) revealed that there were no significant differences between the sunscreen and the beach towel ( $p > 0.05$ ) in terms of their fit with a beach mat ( $M_{Towel}=6.03$ ,  $SD=1.39$ ,  $M_{Sun}=6.32$ ,  $SD=1.14$ ), consumers' knowledge ( $M_{Towel}=4.60$ ,  $SD=1.60$ ,  $M_{Sun}=4.73$ ,  $SD=1.76$ ), purchase regularity ( $M_{Towel}=3.97$ ,  $SD=1.66$ ,  $M_{Sun}=4.48$ ,  $SD=1.87$ ), and the degree of importance ( $M_{Towel}=2.70$ ,  $SD=1.47$ ,  $M_{Sun}=2.30$ ,  $SD=1.68$ ).

Results suggested swimming goggles and after-sun care products could have been another pair to be used for this study (significantly differed in search/experience qualities but similar in all other confounding variables), but this pair was not selected because of their fit with a beach mat. The participants evaluated both products as not a good recommendation for consumers purchasing a beach mat. This could be problematic because people may evaluate both products equally negatively because of their bad fit with a beach mat and not because of their search/experience qualities. Therefore, these were not selected for this study. See Table 15 for details.

Table 14  
*Factor Analysis Results for 5 Items of Search Qualities and Experience Qualities*

Item	Factor		<i>h</i> *
	1	2	
It is important for me to see this product to evaluate how well it will perform.	<b>0.90</b>	-0.02	0.80
It is important for me to touch this product to evaluate how well it will perform.	<b>0.79</b>	-0.28	0.70
It is important for me to hear this product to evaluate how well it will perform. <sup>a</sup>	0.12	-0.47	0.22
I can adequately evaluate this product using only information provided by the retailer or manufacturer	-0.27	<b>0.82</b>	0.74
I can evaluate the quality of this product simply by reading information about the product	-0.16	<b>0.88</b>	0.79
	Eigenvalue	2.24	1.01
	Variance Explained (%)	44.84	20.24
	Cumulative (%)	46.80	65.08

Note. *h*\*: communality.

The result was obtained using principle component analysis and Varimax rotation

<sup>a</sup>The item was deleted due to validity issue.

Table 15  
*Mean Scores of Eight Beach related Products Qualities*

Items	Sun-screen		Beach towel		SPF lip balm		Insect repellent spray		Waterproof cellphone case		Beach ball		After sun care		Swimming goggles	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Search/ Experience Qualities	-1.61 <sub>c</sub>	2.30	0.05 <sub>a</sub>	2.09	-1.98 <sub>c</sub>	2.39	-1.64 <sub>c</sub>	2.36	-0.15 <sub>a,b</sub>	2.53	-0.89 <sub>a,b,c</sub>	2.63	-1.69 <sub>c</sub>	2.60	0.11 <sub>a</sub>	2.25
Fit with a beach mat	6.32 <sub>a</sub>	1.14	6.03 <sub>a,b</sub>	1.39	5.47 <sub>b,c</sub>	1.36	4.72 <sub>c</sub>	1.77	4.90 <sub>c</sub>	1.75	4.95 <sub>c</sub>	1.54	5.42 <sub>b,c</sub>	1.55	4.98 <sub>c</sub>	1.58
Knowledge about the product	4.60 <sub>a,b</sub>	1.77	4.73 <sub>a</sub>	1.60	3.82 <sub>b,c</sub>	1.85	3.73 <sub>b,c</sub>	1.88	3.58 <sub>c</sub>	1.87	3.73 <sub>b,c</sub>	1.59	3.58 <sub>c</sub>	1.88	3.53 <sub>c</sub>	1.71
Purchase regularity	4.48 <sub>a</sub>	1.87	3.97 <sub>a,b</sub>	1.66	3.40 <sub>b,c</sub>	1.87	3.97 <sub>a,b</sub>	2.11	2.90 <sub>c</sub>	1.58	2.80 <sub>c</sub>	1.68	3.50 <sub>b,c</sub>	2.14	2.80 <sub>c</sub>	1.59
Product importance	2.30 <sub>a</sub>	1.68	2.70 <sub>a,b</sub>	1.47	3.10 <sub>b</sub>	1.82	2.88 <sub>a,b</sub>	1.87	3.37 <sub>b,c</sub>	1.96	4.65 <sub>d</sub>	1.75	3.45 <sub>b,c</sub>	2.17	4.05 <sub>c,d</sub>	1.71

*Note.* The subscripts are used to indicate which groups are statistically significant from each other based on the Duncan test. The means with different letter subscripts indicates a statistically significant mean difference whereas the means with the same letter subscripts indicate no statistically significant mean difference exists.

#### **4.1.4. Instruments**

The measurement used for this study was the same as Study 1 apart from the product type manipulation question. Dependent measures used in this study were evaluation of the recommended product (Touré-Tillery & McGill, 2015), parasocial relationship (Rubin et al., 1985), and perceived humanlikeness (Bartneck et al., 2009). In addition, four items for product search/experience qualities (Weathers et al., 2007) were added for a manipulation check (See Table 3 and Table 14 for the items).

#### **4.1.5. Data Collection**

As in Study 1, young adults who were between 18 and 36 years of age with experience using a voice assistant, a computer, and a mobile phone were recruited through Amazon MTurk for \$1.50. Prior experience of using a voice assistant was necessary because participants were randomly assigned to one of the shopping medium type conditions. Those assigned to the voice assistant condition had to watch simulated videos of interacting with a hypothetical voice assistant, which would be difficult to understand without any experience of using a voice assistant.

Amazon MTurk was used to recruit participants. Amazon MTurk is an open online marketplace with a large, diverse workforce of over 100,000 users from over 100 counties (Pontin, 2007). Amazon MTurk is becoming an important online recruitment pool for the academic community due to several advantages. Amazon MTurk enables researchers to recruit participants more conveniently and economically (Antoun, Zhang, Conrad, & Schober, 2015). Amazon MTurk participants can better represent the

population than many other convenience samples because it provides access to a large and diverse subject pool (Buhrmester, Kwang, & Gosling, 2011). Scholars have reported that the quality of the data collected via Amazon MTurk to be as reliable as those obtained through traditional methods (Smith, Roster, Golden, & Albaum, 2016). Also, one study finds Amazon MTurk samples to be as attentive to instructions as student subject pool samples (Hauser & Schwarz, 2016).

#### **4.1.6. Experimental Procedures**

Participants voluntarily participated in the study after reading a short description of the study presented on the Amazon MTurk job dashboard (See Appendix B). The participants were informed that the study aims were to understand 1) how consumers think of the shopping medium presented in the videos and 2) how consumers make purchase decisions. The participants first reviewed and agreed to the information on the consent form. Then, a screening question was presented asking participants to confirm their age and use of voice assistants, computers, and mobile phones. To ensure the participants could view the video with the sound (especially for the voice assistant condition), a sound test was performed. The participants received an audio-based question (the audio file said “select orange”) and they had to select the correct answer out of eight answer choices to continue. When the participants were not qualified or failed to answer the sound test, they were automatically dropped out of the survey.



The online experiment was created using Qualtrics, a web-based survey building software. Participants were randomly assigned to one of the four experimental conditions using the randomizer function in Qualtrics.

In part 1, the participants watched three short interaction videos in which a user interacted with the assigned shopping medium type (a voice assistant or a website). As described in the stimuli development section, the participants were told to choose the one they wished to request to the voice assistant or website between two comparable options. The videos depicted the shopping medium's response to the participant's request. The participants repeated the process for three different kinds of interactions.

In part 2, the participants read the shopping scenario and watched two videos in which the participants were shopping using AROA voice assistant or AROA website. As in Study 1, the first scenario and video depicted a shopping situation in which shoppers searched for the desired product (a beach mat) information. The second scenario and video depicted the situation in which the desired product was purchased, and a recommendation (either a sunscreen or a beach towel) appeared at the end.

Then the participants answered the questionnaire. First, they were asked to recall which product was recommended, then to evaluate the recommended product. After the recommended product evaluation, they completed a questionnaire that contained measurements for parasocial relationship, humanlikeness, the recommended product's search/experience qualities, demographics, and an attention check item, "select strongly disagree." Attention check items (also called instructional manipulation check items) are "trick questions designed to assess participants' attention to instructions" (Hauser & Schwarz, 2016, p. 400). Some researchers suggest MTurk participants could be less

attentive because they complete surveys in unsupervised locations (Chandler, Mueller, & Paolacci, 2014) and recommend to include attention check questions to minimize this potential limitation of Amazon MTurk data (Hauser & Schwarz, 2016). Therefore, this study also included one attention check question, and those who failed to select the strongly disagree were automatically terminated from the study.

## **4.2. Results**

### **4.2.1. Exploratory Data Analysis**

#### **4.2.1.1. Sample Characteristics and Preliminary Analysis**

A total of 477 participants participated via Amazon MTurk. Fifty-five participants who failed to correctly answer the attention check question and four participants who failed to play the videos were removed. In the end, 418 participants' data were used for the analysis.

The average age of the participants was 29.21 (SD= 4.66, range= 19-36). There were 205 males (49.0%) and 213 females (51.0%). The majority were Caucasian (64.4%), followed by African American (14.4%). Their yearly estimated household income varied from less than \$10,000 to \$150,000 or more. The majority owned Amazon Echo (64.7%), followed by Google Home (19.5%). Some participants had more than one voice assistant (5.2%). The average length of ownership was 9 months, and more than half of the participants indicated that they used their voice assistants multiple times during a day. Table 16 describes the characteristics of the sample.

Table 16  
*Participant Characteristics (Study 2)*

<b>Characteristics</b>		<b>Participants (N=418)</b>
Age		19-36 (mean= 29.21)
Gender	Male	205 (49.0%)
	Female	213 (51.0%)
Ethnicity	Caucasian	269 (64.4%)
	African American	60 (14.4%)
	Asian	41 (9.7%)
	Latino/Hispanic	25 (5.9%)
	Native American	7 (1.7%)
	Other	16 (3.7%)
	Income	Less than \$10,000
\$10,000 to \$29,999		78 (18.6%)
\$30,000 to \$49,999		102 (24.4%)
\$50,000 to \$69,999		88 (21.1%)
\$70,000 to \$89,999		74 (17.7%)
\$90,000 to \$99,999		23 (5.5%)
\$100,000 to \$149,999		28 (6.6%)
\$150,000 or more		9 (2.1%)
Voice Assistant Type	Amazon Echo	270 (64.7%)
	Amazon Dot	37 (8.9%)
	Amazon Show	2 (0.5%)
	Google Home	82 (19.5%)
	Google Home Mini	4 (1.00%)
	Apple Home Pod	1 (0.2%)
	2 or more voice assistants	22 (5.2%)
	The frequency of Voice Assistant Usage	More than 4 times a day
2-3 times a day		157 (37.7%)
Once a day		104 (24.9%)
Once a week		46 (10.9%)
Once in two weeks		20 (4.7%)
Once a month		29 (6.9%)
Rarely		4 (0.9%)
Length of Voice Assistant ownership		Mean= 9 months ( <i>SD</i> =6.17)

A set of ANOVA and chi-square tests results indicated no significant differences among the four experimental conditions in terms of gender ( $X^2(3, N=418) = 6.32, p=0.10$ ), age ( $F_{3, 414} = 0.88, p=0.45$ ), ethnicity ( $X^2(18, N=418) = 19.98, p=0.33$ ), income

( $X^2(33, N=418) = 0.95, p=0.10$ ), voice assistant type ( $X^2(12, N=418) = 5.75, p=0.93$ ), frequency of using the voice assistant ( $X^2(18, N=418) = 8.80, p=0.96$ ), and length of the voice assistant ownership ( $F_{3, 414} = 0.06, p=0.98$ ).

In addition, a MANOVA was conducted to check if any differences existed among participants who selected different trial interaction videos. The result indicated that there was no statistically significant differences across the eight conditions (as a result of three different trial interaction videos with two answer choices – gift for (a)mom/(b)dad, deals for (a)home necessities and garden/(b)outdoor and sports, and music for (a)relaxation/(b)brain power) on how realistic the participants perceived the videos were ( $F_{7, 410} = 0.98, p=0.44$ ). Moreover, for both the voice assistant and the website conditions, no statistically significant differences across the eight conditions were found for the perceived humanlikeness of the shopping medium (voice assistant:  $F_{7, 200} = 1.16, p=0.33$ ; website:  $F_{7, 202} = 4.59, p=0.14$ ), the strength of parasocial relationship (voice assistant:  $F_{7, 200} = 1.18, p=0.32$ ; website:  $F_{7, 202} = 0.98, p=0.44$ ), and product evaluation (voice assistant:  $F_{7, 200} = 0.76, p=0.62$ ; website:  $F_{7, 202} = 1.47, p=0.18$ ). Therefore, the eight conditions were combined for the analysis.

#### **4.2.1.2. Measurement Reliability and Validity**

A factor analysis was conducted applying ML estimation for extraction and direct Oblimin rotation. All items except for the willingness to pay item were loaded on the desired factor, confirming the discriminant validity of measures (the results are presented in Table 17). For perceived humanlikeness, all four items loaded on one factor with factor loadings greater than 0.40. The inter-item reliability (Cronbach's *alpha*) of the perceived

humanlikeness was 0.89. All items for the adapted PSI also loaded on one factor, and the Cronbach's *alpha* coefficient of the scale was 0.93. For product evaluation, one item was removed (i.e., "how much are you willing to pay for the recommended product?") because the factor loading was lower than 0.40. The Cronbach's *alpha* coefficient of the remaining items of the product evaluation measure was 0.88. The measurement scores were averaged to create indices for further analyses.

Table 17  
*Factor Analysis Results (Study 2)*

Item	Factor loading			Factor loading (final)		
	1	2	3	1	2	3
<b>Humanlikeness 1</b> (Fake – Natural)	0.21	0.17	<b>-0.48</b>	0.19	0.18	<b>-0.50</b>
<b>Humanlikeness 2</b> (Machinelike – Humanlike)	0.14	0.00	<b>-0.75</b>	0.10	0.02	<b>-0.77</b>
<b>Humanlikeness 3</b> (Unconscious – Conscious)	0.05	0.07	<b>-0.77</b>	0.02	0.09	<b>-0.79</b>
<b>Humanlikeness 4</b> (Artificial – Lifelike)	0.06	0.01	<b>-0.88</b>	0.03	0.03	<b>-0.90</b>
<b>Parasocial 1</b> (I like to compare my ideas with what Alexa/the Amazon website says/shows)	<b>0.57</b>	0.10	0.10	<b>0.57</b>	0.10	0.10
<b>Parasocial 2</b> (Talking to Alexa/Using the Amazon website make me feel comfortable as if I am with friends)	<b>0.73</b>	0.01	-0.12	<b>0.73</b>	0.01	-0.12
<b>Parasocial 3</b> (If Alexa/the Amazon website were humans, I imagine Alexa/the Amazon website as a natural, down-to-earth person)	<b>0.71</b>	-0.01	-0.05	<b>0.71</b>	-0.01	-0.05
<b>Parasocial 4</b> (I like hearing the voice of Alexa/browsing the Amazon website in my home)	<b>0.84</b>	-0.04	-0.01	<b>0.84</b>	-0.05	-0.01
<b>Parasocial 5</b> (Alexa/the Amazon website keeps me company while I use it.	<b>0.79</b>	-0.08	-0.12	<b>0.79</b>	-0.08	-0.13
<b>Parasocial 6</b> (I look forward to using Alexa/the Amazon website again)	<b>0.89</b>	0.05	0.09	<b>0.90</b>	0.05	0.09
<b>Parasocial 7</b> (When Alexa/the Amazon website responds to my request, it seems to understand the kinds of things I want to know)	<b>0.78</b>	0.01	0.06	<b>0.79</b>	0.00	0.06
<b>Parasocial 8</b> (If there were a story about Alexa/the Amazon website in a newspaper or magazine, I would read it)	<b>0.70</b>	0.06	0.04	<b>0.70</b>	0.06	0.04
<b>Parasocial 9</b> (I would miss using Alexa/the Amazon website when I can't use it because it needs to be repaired)	<b>0.66</b>	-0.07	-0.18	<b>0.65</b>	-0.06	-0.18
<b>Parasocial 10</b> (I think Alexa/the Amazon website is like an old friend)	<b>0.51</b>	-0.06	-0.42	<b>0.49</b>	-0.05	-0.43
<b>Parasocial 11</b> (I find Alexa/the Amazon website to be attractive)	<b>0.61</b>	0.07	-0.07	<b>0.60</b>	0.07	-0.08
<b>Evaluation 1</b> (Do you like the recommended product?)	-0.03	<b>0.83</b>	-0.10	-0.05	<b>0.83</b>	-0.12
<b>Evaluation 2</b> (What is your impression of the recommended product?)	0.07	<b>0.86</b>	0.08	0.06	<b>0.86</b>	0.06
<b>Evaluation 3</b> (What are your thoughts on the quality of the product?)	0.00	<b>0.68</b>	-0.17	-0.02	<b>0.69</b>	-0.19
<b>Evaluation 4</b> (What is your degree of confidence that the recommended product would work as intended?)	0.05	<b>0.70</b>	0.18	0.04	<b>0.70</b>	0.16
<b>Evaluation 5</b> (How likely are you to buy the recommended product?)	0.09	<b>0.59</b>	-0.15	0.07	<b>0.59</b>	-0.16
<b>Evaluation 6</b> (How much are you willing to pay for the recommended product?) <sup>a</sup>	0.00	<b>0.15</b>	-0.14	-	-	-
Eigenvalue	9.21	1.85	1.18	9.17	1.85	1.17
Variance Explained (%)	43.84	8.80	5.62	45.84	9.22	5.85
Cumulative (%)			58.26			60.91

Note. a. The item was deleted due to validity issue.  
The result was obtained using Principle Component Analysis and Direct Oblimin rotation.

#### 4.2.1.3. Manipulation Check

In Study 2, the participants were randomly assigned to one of four conditions (shopping medium type (voice assistant vs. website) x product type (task-oriented vs. socially oriented)). A factor analysis and a 2-way ANOVA were conducted to check if the manipulation of the product type was successful. First, a factor analysis was conducted applying principle component analysis estimation for extraction and Varimax rotation to test whether the four items used to measure product's search/experience qualities create distinctly two different factors. The results showed the search qualities items and experience qualities items were separated as different components with eigen values of 1.54 (37.62% of the variance) and 1.34 (33.46% of the variance), respectively. Using the same method as in Pilot Study 3, the products' search/experience qualities indices were calculated by subtracting the mean score of search qualities items from the mean score of experience items.

A 2-way ANOVA was conducted to check the manipulation of interaction style (task-oriented vs. socially-oriented). The test result showed the product type manipulation was successful, indicating participants evaluated the sunscreen as having more search qualities and the beach towel as having more experience qualities in both the voice assistant and the website conditions ( $F_{1,417}=8.64, p=0.003$ ). The interaction effect was not statistically significant ( $F_{1,417}=0.09, p=0.77$ ). Thus, there was no unintended interaction effect of product type manipulation with the shopping medium types (See Table 18).

Table 18  
*Manipulation Check ANOVA Results using Product Qualities Index (Study 2)*

Independent Variable	df	df error	F	Condition	Mean	SD	95% Confidence Interval	
							Lower Bound	Upper Bound
Product Type	1	417	8.64	Voice Assistant – Towel	3.86	0.13	3.62	4.11
				Voice Assistant – Sunscreen	4.28	0.13	4.02	4.53
				Website – Towel	4.45	0.13	4.20	4.70
				Website - Sunscreen	4.79	0.13	4.54	5.04

Cell size of product type was sunscreen = 206, beach towel = 212

Cell size of shopping medium type manipulation was voice assistant = 208, website = 210

#### 4.2.1.4. Correlation analysis.

Before starting the analysis, a correlation analysis between dependent measures was conducted to check for the multicollinearity concern. The results confirmed that perceived humanlikeness, parasocial relationship, and product evaluation were only moderately correlated (0.42~0.69) (See Table 19).

Table 19  
*Correlations Between Perceived Humanlikeness, Parasocial Relationship, Product Evaluation Measures (Study 2)*

	Perceived Humanlikeness	Parasocial Relationship	Product Evaluation
Perceived Humanlikeness	1		
Parasocial Relationship	0.69**	1	
Product Evaluation	0.42*	0.51**	1

Note. N=418, \*p<.05, \*\*p<.01, \*\*\*p<.001

#### 4.2.2. Hypothesis Testing

##### 4.2.2.1. Main Effect of Shopping Medium Type

A MANOVA was conducted to test the hypotheses. The Levene's test of equality of error variances was not statistically significant for perceived humanlikeness, parasocial



relationship, and product evaluation ( $p>0.05$ ), indicating that the homogeneity of variance assumption was satisfied.

The multivariate test results showed a significant effect of shopping medium type on perceived humanlikeness, parasocial relationship, and product evaluation (Wilks'  $\Lambda = 0.95$ ,  $F_{3, 414}=7.87$ ,  $p=0.000$ , partial  $\eta^2=0.05$ ). The follow-up ANOVA analyses reported a significant effect of the shopping medium type on all three dependent variables (see Table 20). However, opposite to the hypotheses, the mean scores suggested the website was more positively evaluated than the voice assistants in all variables (see Table 21). The website was perceived as more humanlike than the voice assistant ( $F_{1, 417}=20.09$ ,  $p=0.00$ , partial  $\eta^2 = 0.05$ ;  $M_{\text{web}}=4.36$ ,  $M_{\text{voice}}=3.71$ ). The participants formed a stronger parasocial relationship with the website than with the voice assistant ( $F_{1, 417}=19.79$ ,  $p=0.00$ , partial  $\eta^2 = 0.05$ ;  $M_{\text{web}}=4.73$ ,  $M_{\text{voice}}=4.19$ ). And the participants in the website condition evaluated the recommended product more positively than those in the voice assistant condition ( $F_{1, 417}=5.39$ ,  $p=0.02$ , partial  $\eta^2 = 0.01$ ;  $M_{\text{web}}=5.01$ ,  $M_{\text{voice}}=4.78$ ). Therefore, Hypotheses 1~3 were not supported, and these results are consistent with Study 1. However, unlike Study 1, Study 2 results suggest that product evaluation depended on the product type, which is explored later in the chapter.

Table 20  
*Multivariate and Univariate Analyses of Variance for Perceived Humanlikeness, Parasocial Relationship, and Product evaluation (Study 2)*

Source	DV	MANOVA				ANOVA		
		Wilk's $\lambda$	F <sub>3, 414</sub>	<i>p</i>	Partial $\eta^2$	F <sub>1, 417</sub>	<i>p</i>	Partial $\eta^2$
Shopping Medium Type	Perceived Humanlikeness	0.95	7.87	0.00	0.05	20.09	0.00	0.05
	Parasocial Relationship					19.79	0.00	0.05
	Product Evaluation					5.39	0.02	0.01
Product Type	Perceived Humanlikeness	0.99	0.76	0.52	0.01	0.68	0.41	0.002
	Parasocial Relationship					0.11	0.74	0.00
	Product Evaluation					0.08	0.78	0.00
Shopping Medium Type x Product Type	Perceived Humanlikeness	0.98	2.64	0.049	0.02	0.25	0.62	0.001
	Parasocial Relationship					0.13	0.72	0.00
	Product Evaluation					5.36	0.02	0.01

*Note.* ANOVA = univariate analysis of variance; MANOVA = multivariate analysis of variance.

Table 21  
*Mean Scores and Confidence Interval for the Perceived Humanlikeness, Parasocial Relationship and Product Evaluation by Shopping Medium Type (Study 2)*

Device	Perceived Humanlikeness		Parasocial Relationship		Product Evaluation	
	Sunscreen	Beach Towel	Sunscreen	Beach Towel	Sunscreen	Beach Towel
Voice Assistant	3.61 [3.32; 3.90]	3.80 [3.52; 4.08]	4.23 [3.99; 4.47]	4.15 [3.92; 4.38]	4.89 [4.69; 5.08]	4.69 [4.50; 4.88]
Website	4.33 [4.05; 4.62]	4.38 [4.10; 4.67]	4.72 [4.49; 4.96]	4.73 [4.49; 4.96]	4.89 [4.70; 5.08]	5.14 [4.95; 5.33]

*Note.* Numbers inside the bracket indicate the 95% confidence interval.

#### 4.2.2.2. Mediation Analyses

A mediation analysis was conducted with Haye's PROCESS path-analysis macro (Hayes, 2008; Model 6) to test Hypothesis 4. The 95% confidence interval of the indirect effects was obtained with 5000 bootstrap resamples (Preacher & Hayes, 2008) (See Table 22, Table 23 for details). Perceived humanlikeness and parasocial relationship were entered as the two mediators, the shopping medium type as the independent variable, and product evaluation as the dependent variable.

The indirect effect of shopping medium type on product evaluation through two mediators, perceived humanlikeness and the parasocial relationship, was statistically significant with a point estimate of 0.12. The 95% bias bootstrap confidence interval did not include zero (95% CI = [0.031, 0.195]). All paths in the model, shopping medium type to perceived humanlikeness ( $\beta = 0.65$ ,  $t(420) = 4.47$ ,  $p = 0.000$ ), perceived humanlikeness to parasocial relationship ( $\beta = 0.56$ ,  $t(419) = 18.93$ ,  $p = 0.000$ ), and parasocial relationship to product evaluation ( $\beta = 0.34$ ,  $t(418) = 7.22$ ,  $p = 0.000$ ), were statistically significant. The direct effect of shopping medium type on product evaluation was not statistically significant ( $\beta = 0.21$ ,  $t(420) = 2.16$ ,  $p = 0.03$  to  $\beta = -0.01$ ,  $t(418) = -0.10$ ,  $p = 0.92$ ) when controlling for perceived humanlikeness and parasocial relationship. Thus, perceived humanlikeness and parasocial relationship fully mediated the shopping medium type effect on product evaluation. The mediation analysis result supported the hypothesized sequential mediation process (i.e., participants develop a stronger parasocial relationship with a shopping medium that they perceive as more humanlike, and the parasocial relationship leads to higher product evaluation). Therefore, Hypothesis 4 was supported. Figure 6 displays the results.

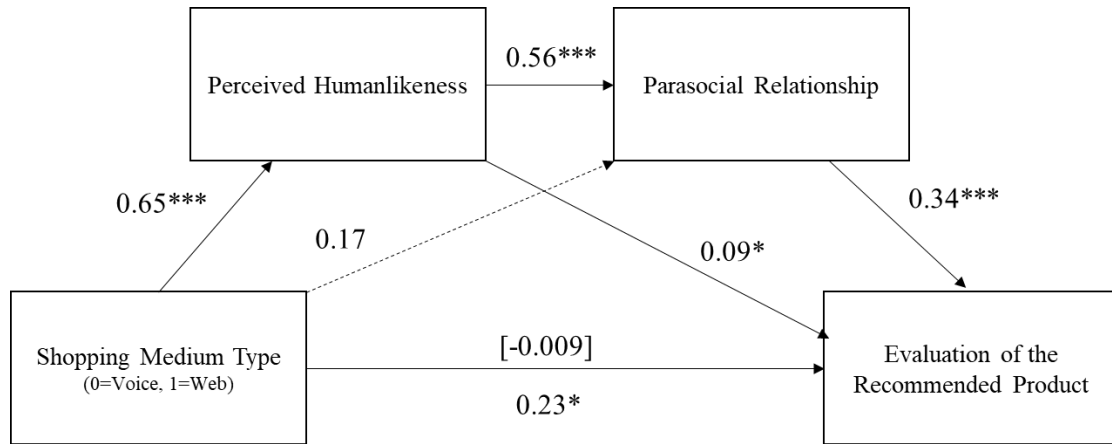


Figure 6. Direct and sequential mediation model with path coefficients (Study 2)

Note: The model was significant  $F(3, 414)=51.41, p=0.00$ .  $*p < 0.05$ ,  $**p < 0.01$ ,  $***p < 0.001$ . The number inside the bracket is the weight for the direct path between shopping medium type and evaluation of the recommended product. The solid lines represent statistically significant effects and the dotted lines represent statistically insignificant effects.

Table 22  
Mediation Analysis and Regression Results of Shopping Medium Type on Product Evaluation via Mediators (Study 2)

Dependent Antecedent	Indirect Paths												
	Perceived Humanlikeness( $M_1$ )				Parasocial Relationship ( $M_2$ )				Product Evaluation				
	Coeff.	SE	<i>t</i>	<i>p</i>	Coeff.	SE	<i>t</i>	<i>p</i>	Coeff.	SE	<i>t</i>	<i>p</i>	
Shopping Medium Type	0.65	0.15	4.47	0.00	0.17	0.09	1.90	0.06	-0.03	0.09	-0.34	0.73	[0.23] [0.10] [2.34] [0.02]
( $M_1$ ) Perceived Humanlikeness	-	-	-	-	0.56	0.03	18.93	0.00	0.09	0.04	2.22	0.03	
( $M_2$ ) Parasocial Relationship	-	-	-	-	-	-	-	-	0.34	0.05	7.22	0.00	
Constant	3.0	0.23	13.23	0.00	1.95	0.17	11.77	0.00	3.06	0.18	16.75	0.00	[4.56] [0.15] [29.57] [0.00]

\*Note: numbers indicated in the parentheses refers to the direct effect of shopping medium type on product evaluation. Shopping Medium Type: 0=Voice assistant, 1= Website

Table 23  
*Indirect Effects of Shopping Medium Type on Product Evaluation via Mediators (Study 2)*

Indirect Effects	Effect	Boot SE	95% Confidence Interval LL	UL
Shopping Medium Type → Perceived Humanlikeness → Parasocial Relationship → Product Evaluation	0.12	0.03	0.031	0.195
Shopping Medium Type → Perceived Humanlikeness → Product Evaluation	0.06	0.03	0.003	0.121
Shopping Medium Type → Parasocial Relationship → Product Evaluation	0.06	0.03	-0.002	0.121

#### 4.2.2.3. Moderating Effect of Product Type

Hypothesis 6 posited the shopping medium type effect on dependent variables would be stronger when an experience (vs. search) product was recommended. The multivariate test results indicated a significant two-way interaction effect of shopping medium type and product type on perceived humanlikeness, parasocial relationship, and product evaluation (Wilks'  $\Lambda = 0.98$ ,  $F_{3, 412}=2.64$ ,  $p=0.049$ , partial  $\eta^2=0.02$ ). A follow-up ANOVA analysis revealed a significant two-way interaction effect of shopping medium type and product type on product evaluation ( $F_{1, 417}=5.36$ ,  $p=0.02$ , partial  $\eta^2=0.01$ ) but not for perceived humanlikeness ( $F_{1, 417}=0.25$ ,  $p=0.62$ , partial  $\eta^2=0.001$ ) and parasocial relationship ( $F_{1, 417}=0.13$ ,  $p=0.72$ , partial  $\eta^2=0.000$ ) (See Table 20).

The mean scores were evaluated to illuminate the nature of the interaction. The mean scores are provided in Table 24. For the search product (i.e., sunscreen), no significant difference in product evaluation was found between the two shopping mediums. Therefore, Hypothesis 6-2 that proposed that no significant difference between the two shopping mediums would be found for consumers' evaluation of the search product was supported. However, for the experience product (i.e., beach towel), a significant difference was found between the two shopping mediums such that the

participants in the website condition evaluated the recommended product more positively than the participants in the voice assistant condition ( $M_{web}=5.14$ ,  $SD=1.06$ ,  $M_{voice}=4.69$ ,  $SD=0.92$ ). Therefore, Hypothesis 6-1 that proposed users of voice assistants would evaluate the recommended experience product more positively than users of websites was not supported. Figure 7 visually illustrates this interaction.

Table 24  
*Product Evaluation Mean Scores (Study 2)*

Variable	Voice Assistant		Website		$t(207)$	$p$	Cohen's $d$
	$M$	$SD$	$M$	$SD$			
Sunscreen	4.89	0.96	4.89	0.99	-0.004	0.997	0.00
Beach Towel	4.69	0.92	5.14	1.06	-3.30	0.001	0.45

Cell size of product type was sunscreen = 206, beach towel = 212

Cell size of shopping medium type manipulation was voice assistant = 208, website = 210

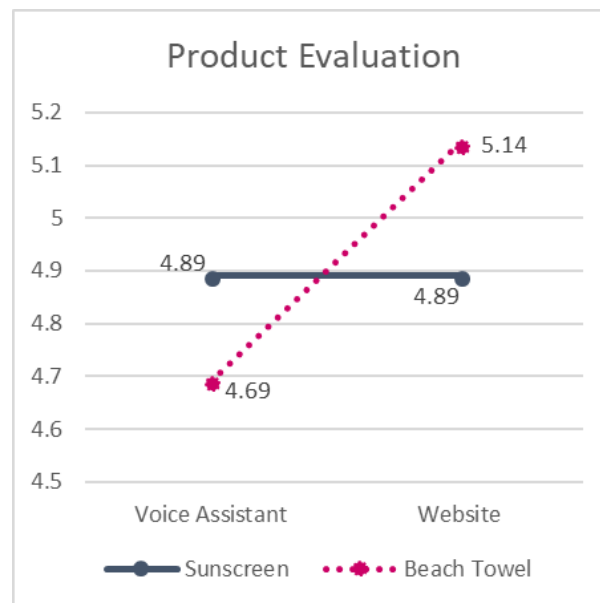


Figure 7. The interaction effect of shopping medium type and product type on product evaluation (Study 2)

### **4.3. Discussion**

Study 2 aimed to investigate the shopping medium type effect using a hypothetical retailer. A hypothetical retailer was created for Study 2 because it was speculated that the unexpected positive effect of the website in Study 1 could be attributed to participants' preexisting relationship with Amazon. Because a follow-up study after Study 1 confirmed that people perceived voice assistants to be more humanlike than websites and computers, using a hypothetical brand would eliminate the confounding effect of participants' experience with a well-known brand and provide supporting evidence for the hypotheses. However, the Study 2 results replicated the findings of the Study 1, and the majority of the hypotheses were again rejected. Compared to the voice assistant, the participants perceived the website to be more humanlike and formed a stronger parasocial relationship with it.

One possible explanation for this result may be related to what participants think of when they were asked to evaluate websites. The key difference between Study 2 and the follow-up study was the presence of a brand. While Study 2 had a specific brand AROA, the follow-up study only measured how the participants perceived websites in general. Thus, while people do not consider websites as humanlike, they may perceive a retailer's website to be highly humanlike because very non-humanlike websites automatically trigger participants to relate websites to their operating brands. Once participants relate websites to the brands, they may also end up recalling diverse human sources related to these brands. Studies that suggested consumers use information from diverse sources such as store name, service quality, merchandise, store environment,

store personnel, and the brand to infer a store's personality (Baker, Grewal, & Parasuraman, 1994; Brengman & Willems, 2009) supports this possibility.

Although the website was found as more humanlike than the voice assistant, the findings still provided additional evidence for the sequential mediation process. The participants formed a stronger parasocial relationship with the shopping medium that they perceived as more humanlike and evaluated the product recommended by this shopping medium more positively. This finding was consistent with the relationship proposed by parasocial interaction theory (Horton & Wohl, 1956; Hartmann, 2008) and anthropomorphism literature (Lee et al., 2005). Participants developed a stronger parasocial relationship with the shopping medium perceived as more humanlike (Hartmann, 2008), and were influenced more by the shopping medium they formed a stronger bond with (Park & Lennon, 2006).

In addition to the hypothesized indirect effect with the two mediators (i.e., perceived humanlikeness, parasocial relationship), the mediation analysis revealed that perceived humanlikeness alone mediated the relationship between the shopping medium type and product evaluation. This indirect path was not surprising considering that anthropomorphism literature had repeatedly shown that perceived humanlikeness of an object alone could influence consumers' decisions (Aggarwal & McGill, 2007, 2012; Kim & McGill, 2011; Touré-Tillery & McGill, 2015).

The Study 2 results also confirmed the moderating effect of product type. As hypothesized, evaluation of an experience product varied depending on the shopping medium type while a search product remained constant regardless of the shopping medium type. However, contrary to the hypothesis, the participants in the website



condition evaluated the experience product more positively than the participants in the voice assistant condition.

Although the moderating effect hypothesis was not supported, the result seemed to support that people were more influenced by a recommendation made by a close other when evaluating an experience product than a search product. Because the website was perceived as more humanlike than the voice assistant, participants built a stronger parasocial relationship with the website and evaluated the experience product recommended by the website more positively than those recommended by the voice assistant. This finding was consistent with the previous research that showed consumers to rely more on other's recommendations when purchasing an experience product (Jain & Posavac, 2001; Keeling et al., 2010; Senecal & Nantel, 2004; Weathers et al., 2007). For example, Senecal and Nantel (2004) demonstrated that consumers were more influenced by the recommender's opinion when the recommended product was an experience product (i.e., wine) than when it was a search product (i.e., calculator). Jain and Posavac (2001) also found that the level of a source's credibility was more critical on influencing consumers' evaluation of the experience qualities whereas a source's credibility did not influence the evaluation of the search qualities of a product.

However, this result should be interpreted with one important confounding factor in mind. Due to the inherent difference between shopping on two different shopping mediums, the visual information was only available on websites and not on voice assistants. This difference could have contributed to the finding that participants in the website condition evaluated the experience product more positively than participants in the voice assistant condition. Unlike verbal information, visual information such as

images can fulfill the need for evaluating experience qualities to some extent. The close-up images of a product and three-dimensional images that rotate can help customers to estimate visual and tactile qualities of the product (Fiore, Jin, & Jin, 1108). Therefore, the enhanced product evaluation found for experience product that requires more information on websites may be reasonable.

## **CHAPTER 5**

### **GENERAL DISCUSSION**

The chapter begins with a summary of Study 1 and Study 2 findings. Next, the chapter explains the theoretical and managerial implications of this research. Lastly, the limitations of this research and suggestions for future research are presented.

#### **5.1. Summary of the Research and Conclusion**

The main goal of this study was to investigate how shopping with voice assistants may be uniquely different from shopping on websites. Specifically, it was hypothesized that consumers perceive voice assistants as more humanlike than websites because of the way voice assistants are designed (i.e., vocal conversation), which results in forming a closer parasocial relationship with the voice assistant. It was proposed that this parasocial relationship would make the voice assistants an effective salesperson and that consumers would evaluate a product recommended by a voice assistant more positively than the one recommended by a website. Lastly, the study aimed to understand the effect of two moderators, interaction style and product type.

To test these relationships, two studies were conducted. Study 1 invited participants to the research lab and had them directly interact with either a voice assistant (i.e., Amazon Echo) or a website (i.e., the Amazon website) for 10 minutes to test the proposed relationships. In Study 2, an online experiment was conducted using a hypothetical retailer's voice assistant and website to test the proposed relationships while eliminating the preexisting relationships participants had with the website and the voice assistant.

In both studies, online shoppers perceived websites to be more humanlike than voice assistants. This was inconsistent with the previous literature which demonstrated objects with anthropomorphic cues were perceived as more humanlike and easily anthropomorphized (Aggarwal & McGill, 2007; Ahn, Kim, & Aggarwal, 2014; Kim & McGill, 2011). However, the follow-up study showed participants evaluated voice assistants as more humanlike than websites when a specific brand was not introduced. This conflicting result may suggest participants evaluated a website as more humanlike when they could relate it to a specific brand and those operating the brand. Because a website is a tool and an interface between two users rather than a human partner, users may bypass the website and instantly relate to companies operating the website when they can.

While this speculation was never tested directly, studies investigating consumers' attitudinal and behavioral responses toward websites seemed to support this reasoning. The studies demonstrated that users of a website often saw beyond the website itself and could generally evaluate the website owner/operator (Barcelos, Dantas, & Sénécal, 2018; Thorson & Rodgers, 2006). For example, Thorson and Rodgers (2006) demonstrated that although users did not directly engage with a political candidate, they were able to form a positive impression toward the candidate when exposed to the candidate's blog. Similarly, Barcelos et al. (2018) demonstrated that users' perception of the brand's personality was influenced by the tone of written contents posted on the brand's social media platform.

This may suggest that consumers do uniquely perceive voice assistants as pseudo-human agents, separate from their producers/operators. Human-computer interaction

literature provides support to this notion that users may attribute individuality to voice assistants (Gong & Lai, 2003; Lee & Nass, 2004; Nass & Lee, 2001; Nass & Moon, 2000). For example, a study by Lee and Nass (2004) showed that people attribute individuality to each voice they hear through a computer. When people heard five different voices, they perceived those five synthetic voices as five distinct persons' opinions. If this was true, the way consumers perceive and evaluate voice assistants could be qualitatively different from how they perceive and evaluate websites. However, paradoxically, the comparison between a website and a voice assistant might have turned into the comparison between a retailer that was related to various humans and a humanlike machine that was still clearly not a real human. As a result, voice assistants could have been perceived as less humanlike than websites in the experiments.

The results of the two studies supported that humanlikeness perception leads to parasocial relationships. The participants formed a stronger parasocial relationship with websites than with voice assistants even when the preexisting relationship was controlled by creating a hypothetical retailer (Study 2). Consumers' perception of websites as a more humanlike shopping medium would have consequently led them to form a stronger parasocial relationship with websites. This was in line with the parasocial relationship literature that suggested users develop parasocial relationships with more humanlike agents (Giles, 2002; Hartmann, 2008; Lee et al., 2005).

The study also investigated two moderators, interaction styles and product types. The results did not provide support for the moderating effect of interaction style. The insignificant results may suggest interaction style was not a meaningful construct for user-shopping medium interaction. Although voice assistants and websites offered a wide

range of skills, these skills still could only make limited kinds of interactions not comparable to humans-to-human interactions. Therefore, the interaction style that was often used within the human-to-human interaction context (Dibble et al., 2016; Duncan, 1984; Keeling et al., 2010; Luor, Wu, Lu, & Tao, 2010; Williams & Spiro, 1985) may have been ineffective in the current context. Moreover, consumers may have held different expectations with shopping mediums and were unaffected by the interaction style. For example, Branigan et al. (2011) demonstrated that participants modified their responses to align with a computers' response because they believed it to be a better way to increase the likelihood of communicative success. Thus, although the interaction style was manipulated, their perception of the shopping mediums could have remained the same.

However, more research is needed to conclude whether interaction style influences the way users perceive shopping mediums because the insignificant results may be due to weak manipulation. An examination of the interaction style manipulation check scores provides some support for this possibility. The interaction style perception difference between socially-oriented and task-oriented interaction conditions is small (Voice assistant:  $M_{\text{social}}=4.19$ ,  $M_{\text{task}}=5.76$ ; Website:  $M_{\text{social}} 4.73$ ,  $M_{\text{task}}=5.57$ ). The mean values of socially-oriented interactions are still above the midpoint of the 7-point scale, suggesting both interactions are perceived as relatively task-oriented. Therefore, the significant moderating effect of interaction style may be found once the manipulation is adjusted to have a greater difference between the two conditions.

The results showed the product type significantly moderated the effect of shopping medium on product evaluation. Consumers evaluated the experience product

more positively when it was recommended on a website than when it was recommended by a voice assistant. In contrast, the search product was evaluated similarly whether it was recommended on a website or by a voice assistant. This finding was consistent with the previous studies which showed consumers rely more on other's opinions to evaluate experience products than search products (Jain & Posavac, 2001; Keeling et al., 2010; Senecal & Nantel, 2004; Weathers et al., 2007).

It is important to note that various kinds of confounding factors could have contributed to the result. For example, as discussed earlier, an important confounding factor could be the difference in visual information availability. In the experiment, the experience product, a beach towel, could have amplified effects of this confounding factor because visual information (i.e., design, a hint of tactile information) is likely to be more critical for evaluating beach towels than some other experience products such as books. The website condition participants who received visual information of the beach towel could have evaluated it more positively than the voice assistant condition participants because they could see the color and design. Other factors such as voice assistant's unnatural voice tone, novelty of voice assistants, and familiarity with each shopping style could also have confounded to the results. Participants in the voice assistant condition could have responded differently not because of the perceived humanlikeness but because of the unique characteristics of voice assistants or their level of experience with the voice assistants. Therefore, the findings should be interpreted with caution.

While the design of the current study cannot isolate the effects of the confounding factors, the fact that online shoppers evaluated the search product similarly across two

shopping mediums needs attention. Even when the visual information of the recommended product was not available on voice assistants, online shoppers still evaluated the product offered by the voice assists equally positively as the product recommended by the website. This result may suggest that consumers may not trust a voice assistant's opinion on products that require subjective evaluation (e.g., information retrieved using human senses such as sight, touch) but trust a voice assistant's ability to search and sort information on products that mainly require objective evaluation (e.g., information provided by retailers or manufactures). However, this proposition needs further investigation for verification.

In sum, the results showed consumers perceived websites to be more humanlike than voice assistants and developed a stronger parasocial relationship with websites. However, the results suggest, while consumers related websites to their companies, voice assistants may have been perceived as an independent source detached from their provider. Further, consumers were persuaded more by websites as a result of perceived humanlikeness and parasocial relationship. The result also suggested that in the earlier stage of usage, perceived humanlikeness may have played an important role in influencing consumers' decisions. Lastly, the product type was an important condition that determined the effectiveness of the recommendation. A search product was evaluated similarly between voice assistants and websites while an experience product was evaluated more positively on websites. The summary of the current research is presented in Table 25.



Table 25  
*Summary of the Current Project*

no.	Hypotheses	Study1 (N=85)	Study2 (N=422)
		In-lab experiment Amazon echo vs. the Amazon website	Online experiment Hypothetical voice assistant vs. website
H1	<b>Shopping medium → Humanlikeness</b> Consumers will perceive voice assistants to be more humanlike than websites.	<u>Not Supported</u> VA < Web***	<u>Not Supported</u> VA < Web***
H2	<b>Shopping medium → Parasocial Relationship</b> Consumers will form a stronger parasocial relationship with a voice assistant than with a website.	<u>Not Supported</u> VA < Web***	<u>Not Supported</u> VA < Web***
H3	<b>Shopping medium → Product Evaluation</b> Consumers will evaluate a product recommended by a voice assistant more positively than one recommended by a website.	<u>Not Supported</u> VA < Web***	<u>Not Supported</u> VA < Web***
H4	<b>Shopping medium → Humanlikeness → Parasocial → Product Evaluation</b> Perceived humanlikeness and parasocial relationship will mediate the relationship between shopping medium type and evaluation of the recommended product.	<u>Supported</u> VA < Web*** <i>Partially-mediated</i>	<u>Supported</u> VA < Web*** <i>Fully-mediated</i>
H5-1	<b>Moderating Effect: Interaction Style</b> The interaction style moderates the effect. Specifically, socially-oriented interaction (vs. task-oriented interaction) with a voice assistant will lead users to a) perceive the voice assistant as more humanlike, b) strengthen the parasocial relationship with the voice assistant, and c) evaluate the voice assistant's recommendation more positively.	<u>Not Supported</u> <i>n.s.</i>	-
H5-2	For website users, there is no significant difference between the two interaction styles on a) perceiving the website as more humanlike, b) strengthening the parasocial relationship with the website, and c) evaluating the website's recommendation more positively.	<u>Supported</u> <i>n.s.</i>	-
H6-1	<b>Moderating Effect: Product Type</b> The product type moderates the effect. Specifically, for experience product, consumers will evaluate the recommended product more positively when it is recommended by a voice assistant than a website.	-	<u>Not Supported</u> VA: Search>Ex Web: Ex>Search
H6-2	For search product, consumers' evaluation of the recommended product will be unaffected by the shopping medium type.	-	<u>Supported</u> <i>n.s.</i>

## **5.2. Implications**

### **5.2.1. Theoretical Implications**

This study holds several theoretical implications. First, this study contributes to the literature of voice shopping by making the first step into understanding how consumers may respond to voice shopping. Voice shopping is a relatively new phenomenon that currently receives great attention from retailers, but less is known about how voice assistants might influence consumers' decisions. Although the proposed hypotheses are not supported, the results suggest the possibility that consumers may form a closer relationship with a voice assistant when consumers perceive it as more humanlike. The voice assistants' power of persuasion could increase as users form stronger relationships with their own voice assistants. By bridging anthropomorphism literature and parasocial interaction theory, this study suggests the importance of investigating the relationship between consumers and their voice assistants.

Moreover, this study contributes to prior work on parasocial interaction theory within the field of consumer behavior. This study empirically tests the causal connection between the perceived humanlikeness and the parasocial relationship, which in turn influences the evaluation of the recommended product. Previously, researchers demonstrated the effect of the parasocial relationship on consumers' impulse buying (Park & Lennon, 2004) and satisfaction (Lim & Kim, 2011) in the context of TV home shopping. The current study extends the theory to a non-human agent in the consumer behavior context. Because the agent is a machine in the current study, this study incorporates perceived humanlikeness as an important precondition for the parasocial

relationship development and empirically tests the sequential relationship between perceived humanlikeness and parasocial relationship proposed by Hartmann (2008).

In addition, this was the first study, to the researcher's knowledge, that explored whether forming a parasocial relationship with a more humanlike non-human agent affects consumers' decision. Most studies in these fields have investigated how the relationships between users and machines (e.g., computer, robots) were comparable to human-to-human relationships (Broadbent, 2017; Kim & Sundar, 2012; Lee et al., 2005; Liebers & Schramm, 2017; Nass & Lee, 2001; Nass, Moon, & Green, 1997; Nass et al., 1994) but did not investigate machines' potential role as a persuasive salesperson. Some studies investigated how presenting an avatar on websites influences consumers' perceptions and decisions (Kim & Sundar, 2012; Qiu & Benbasat, 2009), but the focus was only on the enhanced socialness on websites and not on forming relationships with them. However, with the increasing capacity of machines to influence people, machines may also have a stronger impact on people's shopping decisions. This study extended the knowledge on shopping mediums by investigating the non-human machine's potential impact on consumers as a persuasive salesperson based on the parasocial relationship and human-computer interaction literature.

Further, this study advances the anthropomorphism literature within consumer behavior studies. Existing studies mainly focused on the effect of anthropomorphizing products (Aggarwal & McGill, 2007, 2012; Touré-Tillery & McGill, 2015) or brands (Aggarwal & McGill, 2012; MacInnis & Folkes, 2017) on consumers' attitudes and behaviors. Most results reveal that consumers are more positive toward humanlike products/brands that promote themselves. This study goes further to suggest that

consumers may accept non-humanlike recommendations offered by the anthropomorphized shopping mediums that play a role similar to a salesperson. This study confirms that consumers may evaluate the recommended product more positively not because they form a stronger bond with a product being purchased but because they have a stronger bond with the recommender (i.e., the shopping medium).

### **5.2.2. Managerial Implications**

This study provides some managerial implications. First, the study suggests increasing the perceived humanlikeness of a voice assistant could help strengthen the relationship between the voice assistant and users. Although websites are perceived as more human than voice assistants in this study, there is a great possibility that voice assistants will become more humanlike with technological advancement. Inferring from the measurement used to capture regarding perceived humanlikeness, voice assistant developers could focus on designing voice assistants that are more lifelike and could highlight their ability to think, understand others' feelings, tell right from wrong, and make plans to work toward goals. Retailers who want to start offering voice shopping options can carefully consider ways to enhance humanlikeness of the device and encourage consumers to form closer relationships with their devices. Retailers may evaluate characteristics of voice assistants in terms of humanlikeness (e.g., design, the way the device speaks, different functionalities) in order to decide which voice assistant would be best suited to sell their products.

Additionally, the study also suggests that consumers can be persuaded by the website when they shop for experience products more than search products. However,

consumers' evaluation of search products may not be affected by the shopping medium. This suggests retailers using voice assistants should particularly focus on consumers shopping for search products to provide attractive recommendations in the early stage of the relationship. Considering that the amount of product information voice assistants can present is much less compared to websites, selecting a more persuasive product to recommend could be critical.

Moreover, the results suggest that emphasizing the human resources operating websites may have a positive impact on consumers' evaluation of the websites. Highlighting the human employees operating the websites might enhance the humanlike perception of the websites and encourage consumers to form a stronger relationship with the websites, which can possibly lead consumers to evaluate the recommended products more positively. This may be true regardless of whether the recommended products are selected by human operators or by automated algorithms. Thus, retailers should consider ways to effectively introduce the human operators of the websites in which consumers can feel more connected to the websites.

### **5.3. Limitations**

This study held limitations that could be addressed in future research. First, limitations existed from developing an experimental design, which tested the causal effect of different shopping mediums on perceived humanlikeness, parasocial relationships, and product evaluations. To control which products were recommended on a website and by a voice assistant, video stimuli were used. However, in real life, the interaction between users and voice assistants often occurs instantly without allowing

users the time to think about the given options as they would normally have on websites. Therefore, participants' decision making was likely to be a series of rapid evaluations of products in reality. The decision then could have been influenced by the limited time they were given which was not captured in the context of the current study.

Second, although the study was carefully designed so that most factors were controlled (e.g., search phrases, search results, product names), visual information was presented in the website conditions to maintain ecological validity. Product images were a given factor for websites in the study because most websites (including the Amazon website) always provide product images for consumers, and even when a website does not provide any product images, consumers can easily search them on different websites. Therefore, eliminating the visual image of the products for the sake of the study only seemed to reduce the ecological validity. In spite of such limitations, researchers had conducted research on different media comparison and agreed media comparison was important because it directly affected the effectiveness of the messages (Rockwell & Singleton, 2007; Wright, 1974). This study's findings also suggested that the shopping medium type could determine the ways in which consumers evaluate given product recommendations.

Third, the current study compared voice assistants to websites, but the results suggested people relate websites to their operators and not the websites themselves. Therefore, this study was limited in that the direct comparison between voice assistants to websites did not occur. To only evaluate websites themselves and not the operators behind the websites, the study could have encouraged participants to focus only on the website features using specific instructions or asked participants to focus on the

automated part of the websites (e.g., chatbot, recommender system) instead of asking them to evaluate the overall websites. However, it was still possible these experimental designs led to similar results of consumers relating websites to their operators because they had already established the connection between websites and their operators.

Fourth, the generalizability of the study results may have been limited due to sample characteristics. For both studies, only participants from 18 to 36 years old with experience using voice assistants were recruited. Selecting this sample was necessary because voice shopping was a relatively new phenomenon that was mainly used by the age demographic of the participants in this study. However, this sample was likely to have accumulated years of experience of using websites and finding desired items themselves (Barber, Taylor, & Dodd, 2009; Ordun & Ordun, 2015), which could have contributed to a more positive evaluation of websites in general. However, older generations who were less likely to be familiar with both websites and voice assistants might perceive voice assistants to be more humanlike and may form a stronger relationship with voice assistants because they function in a more intuitive manner (i.e., by telling them to do things).

Fifth, the current study only investigated a snapshot of a few different relationship stages. In this study, only a few minutes of interaction (Study 2) and a 10-minute interaction (or more, depending on an individual's prior experience; Study 1) were examined. Because voice assistants and voice shopping are relatively very new, studying participants' well-established relationships was improbable. However, forming a relationship with a voice assistant may have taken a longer time. If this is true, a

longitudinal study could be more appropriate to test how the relationship between users and voice assistants change over time.

#### **5.4. Future Research Recommendations**

This study is one of the first to investigate the new voice shopping phenomena. The results of this study suggest potential areas for future research. First, this study speculates that consumers instantly relate websites to the operating brands. Although previous literature provides some support to this argument, a follow-up study is necessary to directly confirm this assumption. To test the relationship between the operating brand and its shopping mediums, a follow-up study can investigate whether people's evaluations of the website and the voice assistant are influenced when they learn about the operating brand's wrongdoing. If people consider the voice assistant to be a separate source from its operating brand, their evaluation of the voice assistant may be influenced less by what the operating brand does.

Second, a follow-up study can investigate how variations in product features and purchasing conditions affect voice shoppers' decisions. In this study, only the difference between a search product and an experience product is examined while controlling the price, brand name, and involvement level. They are also only add-on products that are frequently bought together when the main product is purchased. However, future research could examine other purchasing scenarios, such as ordering a repeatedly purchased item (a service Google Home offers with Walmart), purchasing intangible goods that do not require visual examination (e.g., music, audio book), goods with varying price points, or deciding between branded goods and generic goods. These studies can provide more



insight on what recommendations consumers are more susceptible to when voice shopping.

Third, as it was discussed earlier in this chapter, the effect of the shopping medium type could vary across different sample groups. Given that the study subjects were young and were likely to be socially active, they may not have found voice assistants to be that useful. However, an older population with less mobility (Lumpkin & Hunt, 1989) may have found a voice assistant more appealing because of its capacity to perform a wide array of tasks, including playing audio books and music, turning lights on and off, and making delivery orders. If this is true, members of an older consumer group may form a stronger bond with voice assistants and may be more influenced by voice assistants.

Fourth, it is noteworthy that the current study is an initial investigation of the voice shopping effect and individual's personality traits or psychological states such as loneliness, uncertainty avoidance tendency, and anthropomorphism tendency could further our understanding of the effect in the context of parasocial relationship. Anthropomorphism literature (Epley et al., 2007; Waytz et al., 2010) posited that some people have a greater tendency to anthropomorphize non-human entities. According to Epley et al. (2007), people who are generally lonelier, are more likely to avoid uncertainty, and have a higher need for cognition are more likely to engage in anthropomorphization. Also, some parasocial interaction theory researchers suggest that loneliness is positively correlated with the strength of parasocial relationships (Wang, Fink, & Cai, 2008). If this is true, vulnerable populations may be more influenced by voice assistants because they are more likely to anthropomorphize voice assistants and

form a stronger parasocial relationship with them. Follow-up research is needed to test this proposition.

Fifth, some personality traits can influence how individuals select, use, and interact with different shopping mediums. One important personality variable, consumer's decision-making style could moderate the shopping medium type effect. For example, Schwartz and colleagues (2002) proposed that some people are willing to settle once they find a good enough option (i.e., satisfier) while others review all alternatives to select the best available option (i.e., maximizer). When new options become available, maximizers will review them to make sure they select the best possible option while satisfiers are more likely to ignore them (Schwartz et al., 2002). Because voice assistants can only present a few options one at a time while websites present few hundreds or more options at once, maximizers are less likely to be satisfied with voice assistants' options when they know hundreds of more options could be available on websites. Such a personality trait and preference can determine consumers' shopping medium preference. Therefore, individual's different decision-making styles should be investigated in the future.

Sixth, although this study only investigated the perceived humanlikeness and parasocial relationship to explain how voice assistants may be different from websites, one primary difference between voice assistants and websites was the way information was presented. While voice assistants provided auditory information, websites primarily provided visual information. A great deal of literature on sensory receptors and information processing identified that auditory processing and visual information processing had distinctive features (Ghirardelli & Scharine, 2009). For example, while

the auditory system can detect sounds coming from anywhere in the 360° range, the visual system can only detect changes happening within sight (Ghirardelli & Scharine, 2009). Therefore, even when the same information was provided through voice assistants or websites, this difference in modality may have been associated with different levels of recall and recognition (Goolkasian & Foos, 2002) and attention (Chambers, Stokes, & Mattingley, 2004). More research on the impact of different modalities of obtaining information may provide additional insights on why an experience product was evaluated more positively when it was recommended by a website than when it was recommended by a voice assistant. Thus, future study should investigate how the different format of information affects people's responses toward the given information.

Lastly, the impact of voice assistants' different vocal characteristics could be investigated further. Although this was not the aim of this particular study, previous studies demonstrated that people form perceptions of an opponent based on the traits inferred from voice characteristics, which could influence the effectiveness of persuasion (Nass & Moon, 2000; Nass et al., 1997; Nass & Yen, 2010). For example, Nass and colleagues (1997) demonstrated that people applied gender stereotypes to computers and evaluated male-voiced computer to be more informative with computer-related facts compared to female-voiced computers. The study also showed that people evaluated female-voiced computers to be more informative about love-and-relationships-related facts compared to male-voiced computers. Similarly, Nass and Yen (2010) reported that people showed greater intent to purchase a gun on an auction website when it was described by a male-voiced computer rather than by a female-voiced computer, while people showed greater intent to purchase a sewing machine when it was described by a

female-voiced computer rather than by a male-voiced computer. These findings suggest that consumers may find voice assistants with a female voice to be more persuasive when they recommend products that are stereotypically associated with femininity and vice versa.

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## APPENDIX A

### STUDY 1 MATERIALS

(Recruitment Flyers, Pre-screening Survey, Instructions, Main Survey)

#### 1. Recruitment Flyers

##### - Onsite Flyer

## Participate in a 30 minute Online Shopping Research Study



### Get a \$10 Target/Starbucks gift card!

We are looking for volunteers to take part in a **30 minute study**. If you are **1) 18~36 years old** and have **2) experience** the following devices used for online shopping - **computer, mobile phone, voice assistants (Amazon Echo or Google Home)** - please consider participating in this study.

For more information about this study or to participate, contact:

**Claire Whang**  
**whang020@umn.edu**

*"Take a photo of it  
before you forget!"*



*This study has been reviewed by the University of Minnesota's Institutional Review Board.*

## - Email Fyler

We kindly ask you to participate in our study about consumers' online shopping behavior using different devices. The study will take about **30-40 minutes** in McNeal Hall in **St. Paul Campus**. You will receive **\$10 gift card** to Target or Starbucks for participating in our study.

If you are 1) **18-36 years old** and have 2) **experience of the following devices used for online shopping** - computer, mobile phone, tablets, **voice assistants (Amazon Echo, Google Home)** - please consider participating in this study.  
Your participation will greatly help us to learn more about consumers' online shopping behavior.

For more information about this study or to participate, please contact:  
**Claire Whang** ([whang020@umn.edu](mailto:whang020@umn.edu))

Thank you,

## - Email Response

Dear \_\_\_\_\_,

Thank you for having interest in this study. Your help would be greatly appreciated.  
If you wish to participate, please complete the following survey: [https://umn.qualtrics.com/jfe/form/SV\\_1yJodJKxSaCEciV](https://umn.qualtrics.com/jfe/form/SV_1yJodJKxSaCEciV)  
**At the end of the survey, there will be a link for you to schedule the visit**  
If none of the time slots fits your schedule, please let me know. I will try to arrange a time that fits your schedule.  
(You are certainly welcomed to participate today)

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Below I have included a lengthy/official email describing the study, but here are the key points:

- The actual experiment time takes about 30-40 minutes (no longer than 1 hour).
- I will ask you to use the device (e.g., computer, mobile phone, tablet, Amazon Echo) and evaluate its performance. You will be asked to complete the survey afterward.
- It will be in **McNeal Hall, room 368A in the St. Paul campus**.
- You will receive \$10 gift card at the end.
- I have attached a consent form to review. You don't need to worry about printing it.

### **Full description:**

Thank you for your interest in participating in the consumer shopping behavior study conducted by Claire Whang under the supervision of Dr. Hyunjoo Im at the University of Minnesota. Attached to this email is the full consent form that you should review and ask any questions you may have (the consent form also has more detail than what is just in the email)

Through this study, we will try to understand how people use devices to shop at home. You will be invited individually and asked to use one of the given devices (e.g., computer, mobile phone, tablet, voice assistant) and evaluate its performance. You will be given a survey to complete after you use the device for about 10 minutes. We expect the study to take about 30 minutes in total (no longer than 1 hour). You will receive a \$10 gift card at the end of the session.

Please make sure to review the consent form attached below before coming to the study so that you are aware of what is expected. At the beginning of the study, you will be asked to sign a paper copy of the same form. If for any reason you are no longer interested in participating, you may end your participation at that time without any consequence.

To participate:

- You need to be 18 ~ 36 years old; we can't have minors
- The study will be conducted in McNeal Hall 368A on the St. Paul campus-University of Minnesota Twin Cities campus; you must be able to get to the interview location on your own.
- You must have direct/indirect(watching others use the device) experience of using a) computer, b) mobile phone, c) tablet and d) voice assistant (e.g., Amazon Echo or Google Home)
- Please complete a short survey to confirm that you are qualified to participate in this study and schedule the visit (see the above link)
- If you are not sure if you qualify to participate, please feel free to email me ([whang020@umn.edu](mailto:whang020@umn.edu)) to find out.

Please let me know if you have any questions or concerns about the study.

Thank you,  
Claire Whang

## 2. Prescreening Survey

This section asks about your device usage behavior.

Please let us know how familiar you are using the following devices.

Do you own a **laptop**? (If you don't have a laptop, you can replace this with a personal computer)

Yes

No

Do you own a **mobile phone**?

Yes

No

Do you or your housemate (e.g., family, roommate, partner) own a **voice assistant** such as Amazon Echo, Amazon Dot, Google home, or Google Mini?

Yes

No

How long have you used your current **laptop** for? (If you don't have a laptop, you can replace this with a personal computer)

Less than 6 months

6 months - 1 year

1 year - 2 years

2 years - 3 years

Over 3 years

How familiar are you with using a **laptop**?

Not familiar at all

Slightly familiar

Moderately familiar

Very familiar

Extremely familiar

How often do you make purchases online using a **laptop**?

More than 4 times a day

2-3 times a day

Once a day

Once a week

Once in two weeks

Once in a month

Other

How long have you used your current **mobile phone** for?

Less than 6 months

6 months - 1 year

1 year - 2 years

2 years - 3 years

Over 3 years

How familiar are you with using your **mobile phone**?

Not familiar at all

Slightly familiar

Moderately familiar

Very familiar

Extremely familiar

How often do you make purchases online using a **mobile phone**?

More than 4 times a day

2-3 times a day

Once a day

Once a week

Once in two weeks

Once in a month

Other

How familiar are you with **Amazon Echo/Google Home**?

Not familiar at all	Slightly familiar	Moderately familiar	Very familiar	Extremely familiar
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How long have you or your housemate used **Amazon Echo/Google Home** for?

Less than 6 months	6 months - 1 year	1 year -2 years	2 years - 3 years	Over 3 years
--------------------	-------------------	-----------------	-------------------	--------------

How often do you use the **Amazon Echo/Google Home**? (in average)

More than 4 times a day	2-3 times a day	Once a day	Once a week	Once in two weeks	Once in a month	Other
<input type="text"/>						

How familiar are you with **Amazon Echo/Google Home**?

Not familiar at all	Slightly familiar	Moderately familiar	Very familiar	Extremely familiar
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What is your student ID? (This will be only used to match this survey with your answers at the lab)

What is your UMN email address? (This will be used to send you the confirmation email)

Please, type in your age.

What is your sex?

Male
Female

What is your ethnicity?

Caucasian	African American	Asian	Latino/Hispanic	Native American	Other
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How long have you used **Amazon website** for?

Less than 6 months	6 months - 1 year	1 year -2 years	2 years - 3 years	3 years-5 years	Over 5 years
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What is your attitude toward Amazon?  
"To me, Amazon is \_\_\_\_\_"

Bad	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Good
Unfavorable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Favorable
Dislikable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Likable
Unappealing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Appealing
Unpleasant	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Pleasant

What is your attitude toward Google?  
"To me, Google is \_\_\_\_\_"

Bad	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Good
Unfavorable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Favorable
Dislikable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Likable
Unappealing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Appealing
Unpleasant	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Pleasant

Thank you for sparing your time to participate in this study.  
Please click "Next" to schedule your visit.

To schedule your visit, please click the following

link: <https://doodle.com/poll/puqetish7a2suszn>

Select one time that suits best with your schedule. Please be aware that the visit can take about 30-40 minutes (no more than 1 hour) for completion. No others will view your registration history.

Please let me know if you have any other questions ([whang020@umn.edu](mailto:whang020@umn.edu))

I look forward to seeing you at the McNeal 368A soon.




### 3. Instructions

#### - Amazon Echo

##### Task-oriented interaction

### Usability Test




Alexa is considered one of the most skillful voice assistant developed by Amazon. It is capable of performing various tasks such as answering factual questions, making to-do lists, setting alarms, providing weather, traffic, and other real-time news information.

*Discover all about Alexa for the next 10 minutes.*

- You need to always say "Alexa" to begin the interaction
- If you wish to stop, just say "Alexa, stop".
- Alexa may **fail to understand** what you've just said. Don't panic! It happens.
- Alexa may **be impatient** and try to process while you are still speaking. Don't panic! You can always try it again for a number of times.


### Usability Test



To begin with, I recommend you to begin with the following questions.

- "Alexa, what is today's news highlight?"
- "Alexa, what's 2,347 multiplied by 1,352?"
- "Alexa, add \_\_\_\_\_ to my to-do list"
- "Alexa, open best buy"
- "Alexa, play K-Love radio station"

### Usability Test




There are many other things to try out as well!  
Here are some more recommendations for you to try out in the remaining time.  
*But Please feel free to be creative and search for different services!*

- "Alexa, when did the new avengers movie released?"
- "Alexa, add coffee to my shopping cart"
- "Alexa, when was the first Star Wars movie released?"
- "Alexa, open grilled cheese recipes"
- "Alexa, flip a coin"
- "Alexa, open movie finder" → "ask movie finder what is the movie where a boy learns he is a wizard"
- "Alexa, what is in my to-do list?"

##### Socially-oriented interaction

### Usability Test




Alexa is a social intelligent virtual assistant developed by Amazon. It is capable of performing various **entertaining tasks** such as music playback, streaming podcasts, playing audiobooks, providing humorous jokes, play diverse games such as 20 questions.

*Discover all about Alexa for the next 10 minutes.*

- You need to always say "Alexa" to begin the interaction
- If you wish to stop, just say "Alexa, stop".
- Alexa may **fail to understand** what you've just said. Don't panic! It happens.
- Alexa may **be impatient** and try to process while you are still speaking. Don't panic! You can always try it again for a number of times.


### Usability Test



To begin with, I recommend you to begin with the following questions.

- "Alexa, good morning"
- "Alexa, how old are you?"
- "Alexa, where are you from?"
- "Alexa, I feel sick"
- "Alexa, let's play twenty questions"

### Usability Test



There are many other things to try out as well!  
Here are some more recommendations for you to try out in the remaining time.  
*But Please feel free to be creative and search for different services!*

- "Alexa, compliment me"
- "Alexa, will you lie to me?"
- "Alexa, Launch Guess the Celebrity"
- "Alexa, are you happy?"
- "Alexa, let's play True or False"
- "Alexa, start Song Quiz"
- "Alexa, open cat translator" → "Meow"

- The Amazon website

Task-oriented interaction


Socially-oriented interaction

**Usability Test** 

Amazon's online website is considered one of the most skillful website. It is designed to provide a wide array of information and services for customers including detailed product information, one-click check-out, easy-to-use shopping cart, recommendations, and many others.

*Discover all about Amazon's online website for the next 10 minutes.*

- You may be already familiar with using Amazon website but try to re-discover the services and information related shopping available via Amazon website.
- You can explore other services & information available through Amazon website.
- You may log-in to your Amazon account while completing the task.

**Usability Test** 

Amazon's online website is considered a social website. It is designed to provide a wide array of information and services **not only limited** to searching product information and making purchases, but also other entertaining services such as music playback, streaming TV shows, and playing audiobooks.

*Discover all about Amazon's online website for the next 10 minutes.*

- Please log-in to your Amazon account (your information will not be saved)
- You may be already familiar with using Amazon website but try to discover the entertainment services and information available via Amazon website.
- You can explore other services & information available through Amazon website.

**Usability Test** 

To begin with, I recommend you to try answering the following questions by browsing the Amazon website.

- Try adding three items into your shopping cart.
- Check how many items there are for Brita water filter.
- Find three items you may be interested in purchasing from Today's deals (see below the search bar to find "Today's deals")
- Find a cheapest headphones on Amazon website
- What are sponsored University of Minnesota products?

**Usability Test** 

To begin with, I recommend you to try answering the following questions by browsing the Amazon website.

- Does Amazon website greet you as you log-in?
- What kinds of personalized offers does Amazon website provide to you?
- Browse Amazon blog (<https://www.aboutamazon.com>)
- Try to heart an item in the [New & Interesting finds] section (Click "New & Interesting finds on Amazon" on the top-left corner → click "Explore" → Select "♡")
- Read 1 article from the Prime Newsletter (Find "Prime" in the top-right corner → Click "Explore Prime Insider" → Click "Newsletter" in the middle right area or Click "Featured")

**Usability Test** 

There are many other things to try out as well! Here are some more recommendations for you to try out in the remaining time. But Please feel free to be creative and search for different services!

- Search for "I love NY" T-shirt
- Add a bag of coffee bean you may be interesting in purchasing to your shopping cart.
- Search one product from "Amazon basics" that you may be interested in purchasing (Type "Amazon basics" in the search basics)
- How much is it to watch an Avengers movie on Amazon website?
- What is the international shipping policies for Amazon website?
- What are the award winning-books? (Search for "Books" → Click "Award winners")

**Usability Test** 

There are many other things to try out as well! Here are some more recommendations for you to try out in the remaining time. But Please feel free to be creative and search for different services!

- How old is Amazon website?
- Browse the Amazon book review page (<https://www.amazonbookreview.com>)
- Create an imaginary pet profile (under "Your account & list" → click "Your pet")
- Explore "Idea list" (under "account & list", click "Explore Idea List")
- What movies/TV shows did Amazon website recommend to you?
- What types of music did Amazon website recommended to you? (under "Your account & list" on the top right → click "My Music Library")

## 4. Main Survey

Next,

You will read a scenario that describes a specific situation.  
Please, pay attention to the scenario and **imagine yourself in the situation** described in the scenario.

Read this scenario carefully and imagine yourself in the situation:

It was one of your typical days.

On your way out,  
you received a text message about your **package** being delivered in the afternoon.

However, you have other plans and were not going to come back home until very late.  
Because you have lost few packages before, you did not want to leave the package outside.

You decided to **ask your neighbor** to hold on to your package while you come back.  
Your neighbor was very kind and agreed to pick up your package.

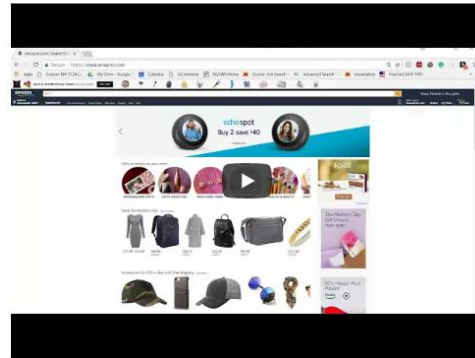
Because this was the 3rd time you asked your neighbor to pick up your package,  
you wanted to **give your neighbor a small gift** for being so kind helpful.

You knew that your neighbor was a big fan of **Herbal Tea**.  
So you decided to purchase a **box of Herbal Tea Bag** for your neighbor.

Please imagine as if you are the one conducting the search:



Please imagine as if you are the one conducting the search:



The scenario continues. Read carefully and imagine yourself in the situation:

You did some more research on Alexa,  
but in the end, decided to purchase the product you initially selected.

As you are purchasing the product, you see the following recommendation.

Please imagine as if you are the one conducting the search:



Please imagine as if you are the one conducting the search:





What is being recommended?

Do you Like this recommended product?

- Dislike a great deal    Dislike a moderate amount    Dislike a little    Neither like nor dislike    Like a little    Like a moderate amount    Like a great deal
- 

What are your thoughts on the quality of the product?

- Far below average    Moderately below average    Slightly below average    Average    Slightly above average    Moderately above average    Far above average
- 

What is your impression of this recommended product?

- Extremely bad    Moderately bad    Slightly bad    Neither good nor bad    Slightly good    Moderately good    Extremely good
- 

What is your degree of confidence that the recommended product would work as intended?

- Extremely doubtful    Moderately doubtful    Slightly doubtful    Neither confident nor doubtful    Slightly confident    Moderately confident    Very confident
- 

How likely will you buy the recommended product?

- Extremely unlikely    Moderately unlikely    Slightly unlikely    Neither likely nor unlikely    Slightly likely    Moderately likely    Extremely likely
- 

How much are you willing to pay for the recommended product?

max (\$)

The following questions are about how you think of the "Amazon Website".

Based on your experience related to Amazon website so far during the experiment, please indicate how much you agree with the following statement.

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
I would like to compare my ideas with what Amazon website says.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Interacting with Amazon website make me feel comfortable, as if I am with friends.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If Amazon website was a human, I imagine Amazon website to be a natural, down-to-earth person.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would like to hear the opinion of Amazon website in my home.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
Amazon website keeps me company while I use it.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I look forward to using Amazon website again.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When Amazon website responds to my request, it seems as if Amazon website understands the kinds of things I want to know.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If there were a story about Amazon website in a newspaper or magazine, I would read it.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
I would miss using Amazon website if I can't use Amazon website because it is being repaired.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I think Amazon website could be like an old friend.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I find Amazon website to be attractive.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

I would describe "Amazon Website" as...

Fake	<input type="radio"/>	Natural
Machine-like	<input type="radio"/>	Human-like
Unconscious	<input type="radio"/>	Conscious
Artificial	<input type="radio"/>	Life-like

---

**This is the last section of the study.**

---

What is your student id?

---

What is your major?

---

Information about income is very important to understand. Would you please give your best guess?  
Please indicate the answer that includes your entire household income in (previous year) before taxes.

- Less than \$10,000
- \$10,000 to \$19,999
- \$20,000 to \$29,999
- \$30,000 to \$39,999
- \$40,000 to \$49,999
- \$50,000 to \$59,999
- \$60,000 to \$69,999
- \$70,000 to \$79,999
- \$80,000 to \$89,999
- \$90,000 to \$99,999
- \$100,000 to \$149,999
- \$150,000 or more

---

This is the end of the survey. Thank you for your participation.

# APPENDIX B

## STUDY 2 MATERIALS

(Recruitment posting on MTurk, Main Survey)

### 1. Recruitment posting on MTurk

Digital Consumer Decision-Making Process

Requester: Claire      Reward: \$1.50 per HIT      HITs available: 0      Duration: 1 Hours

Qualifications Required: Location is US, HIT Approval Rate (%) for all Requesters' HITs greater than 90

HIT Preview

**Instructions**

We are conducting an academic survey about digital consumer behavior. If you wish to participate, click the link below to complete the survey. At the end of the survey, you will receive a code to paste into the box below to receive credit for taking our survey. **If your answer is considered to be not committed for any reason, you may be rejected for compensation.** Please read the instructions carefully and answer all the questions. Thank you for your participation! :-)

- You need to be older than **18 years old and 36 years old and less.**
- You need to be **familiar using devices (e.g., computer, mobile phone) for shopping**
- You need to have an **experience of using a voice assistant** (e.g., Amazon Echo, Amazon Dot, Google Home, Google Mini)
- You need to carefully read each statement and think carefully about each product presented for evaluation.

**Make sure to leave this window open as you complete the survey.** When you are finished, you will return to this page to paste the code into the box.

**Survey link:** [https://umn.qualtrics.com/jfe/form/SV\\_4TLYZqjm0r2u14J](https://umn.qualtrics.com/jfe/form/SV_4TLYZqjm0r2u14J)

**Provide the survey code here:**

## 2. Main Survey

### WELCOME

You are invited to participate in a series of small studies.

You were selected as a possible participant because **you are familiar using online websites and voice assistants, and are 18-36 years old**. This study is being conducted by Claire Whang, Department of Design at the University of Minnesota.

#### **Procedures:**

If you agree to be in this study, you will be asked to complete two studies. The first part is about the usability test. The second part is about purchase decision-making process. In both studies, you will be asked to watch videos displaying different devices used for shopping.

The total process will take approximately 20 minutes.

#### **Risks and Benefits of being in the Study:**

There is no risk to participating in this study.

#### **Confidentiality:**

The records of this study will be kept private. In any sort of report, we might publish, we will not include any information that will make it possible to identify a subject. Research records will be stored securely and only the researchers have access to the records.

#### **Voluntary Nature of the Study:**

Participation in this study is voluntary. Your decision whether or not to participate will not affect your current or future relations with the University of Minnesota. If you decide to participate, you are free to withdraw at any time without affecting those relationships.

#### **Contacts and Questions:**

If you have questions, you are encouraged to contact Claire Whang at McNeal Hall, 1985 Buford Ave, St Paul MN 55108.

If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher(s), you are encouraged to contact the Research Subjects' Advocate Line, D528 Mayo, 420 Delaware St. Southeast, Minneapolis, Minnesota 55455; (612) 625-1650.

---

Only the adults who have used different devices for shopping such as a computer, a mobile phone, and a voice assistant (e.g., Amazon Echo, Google Home) living in the US are eligible for this study. Please confirm that you are

- 18 years old or older & 36 years old or younger;
- Have used online websites using computers;
- Have used mobile phones;
- Have used voice assistants (e.g., Amazon Echo, Google Home);
- and are Currently living in the USA

- Yes, I am eligible for the study
- No, I am not eligible for the study

#### **You will need to have your speaker on to participate in this study.**

Please turn on the speaker or have the headphone ready before you start. As a sample question, listen to the audio file and follow the instruction the speaker is saying.



What did the speaker asked you to do?

- Apple    Banana    Pineapple    Blueberry    Strawberry    Orange    Kiwi    Lemon
-

## STUDY 1 Device Usability Test

We would like to understand how you think of the device displayed in the video.  
You will watch three (3) short videos of you using a **website**.  
Please imagine yourself as if you are the one using the website.

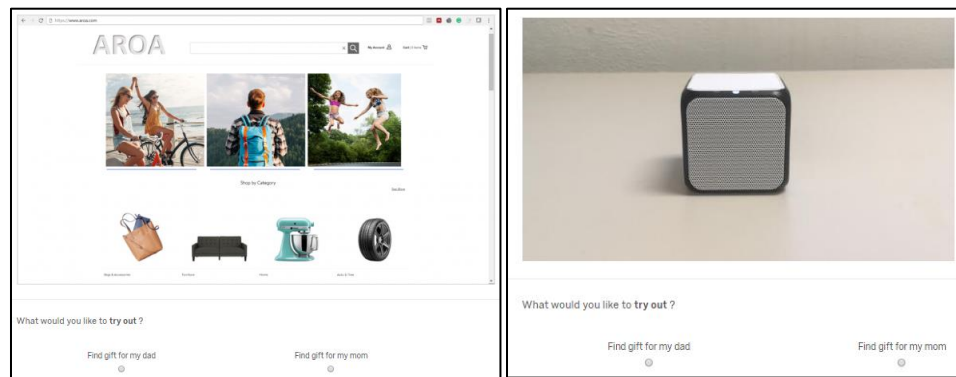
Questions will be provided regarding your evaluation of the website.

Now, please get ready to use a website, **AROA**.

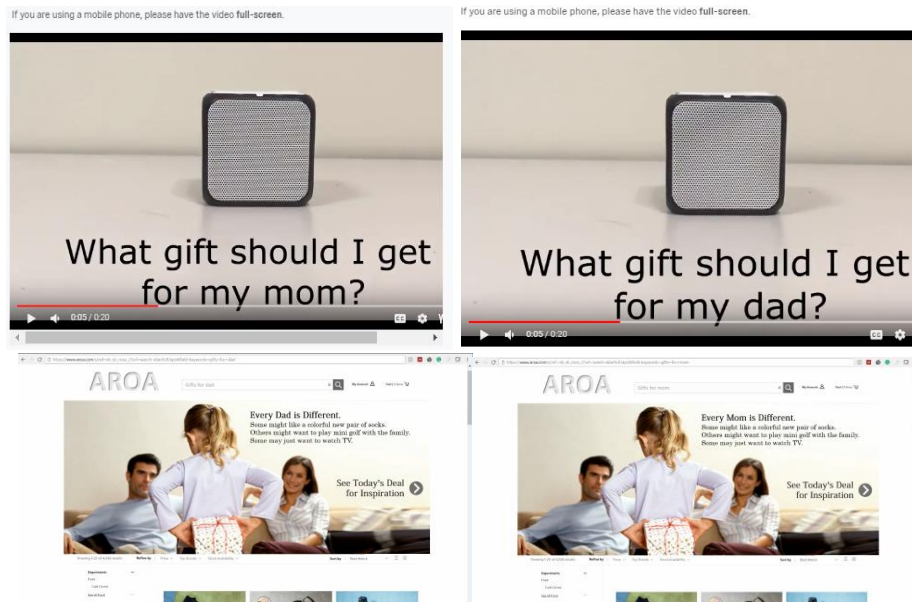
You will have a peek into how the **AROA** website would respond to you in the following section.

**\*\* AROA** is a website of the **AROA Inc.**, a 40-years old international retail corporation that operates a chain of hypermarkets, discount department stores, and grocery stores. As of 2018, AROA Inc. has 11,718 stores and clubs in 28 countries, operating under 59 different names.

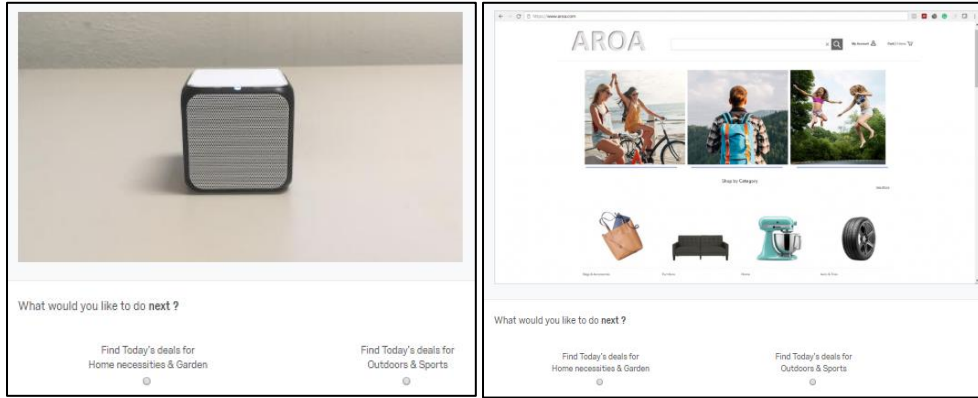
### a) First Interaction



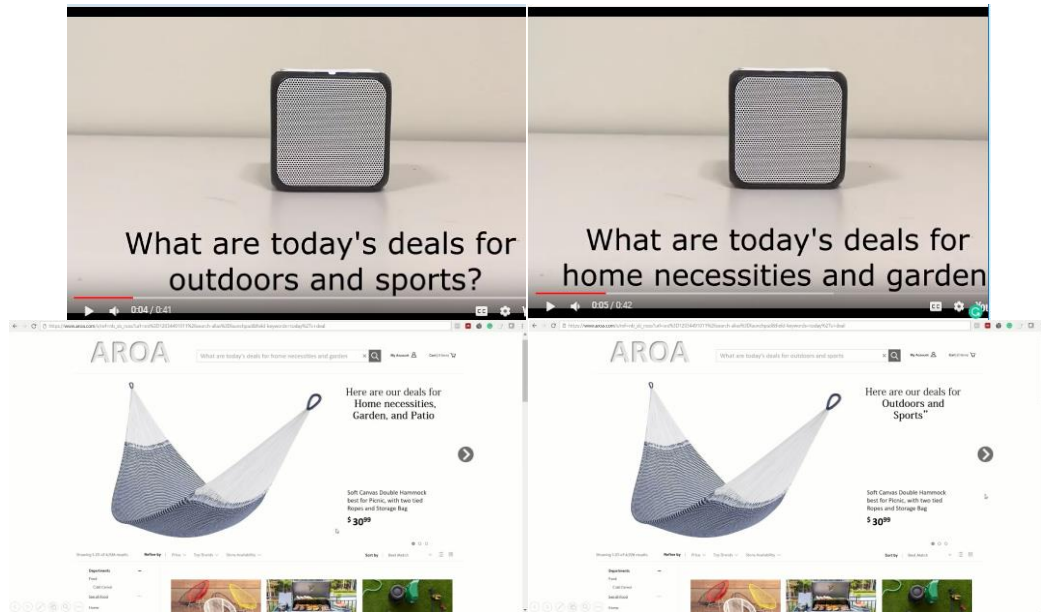
### - Voice Assistant/Website Trial Interaction Videos



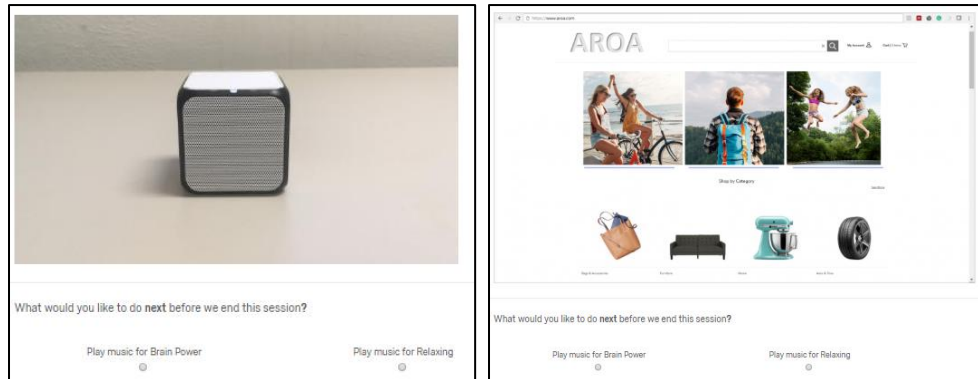
*b) Second Interaction*



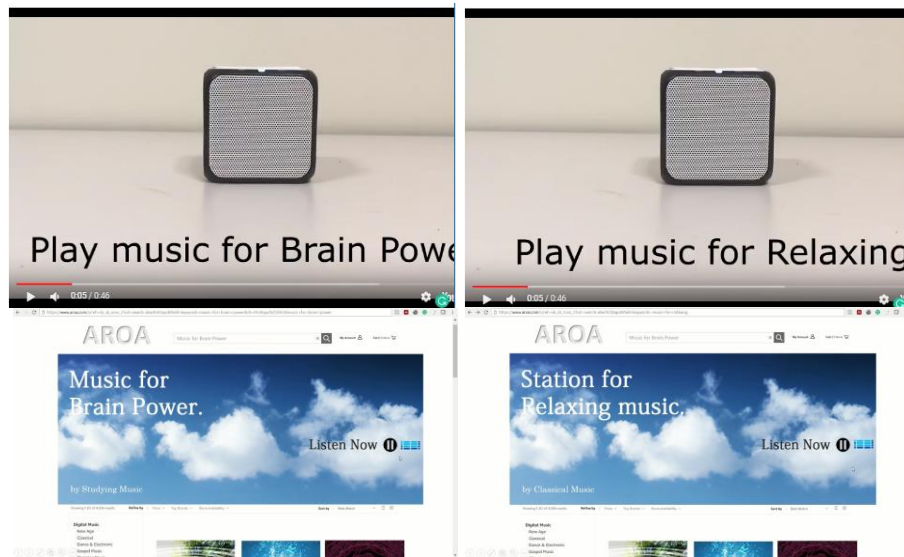
*- Voice Assistant/Website Trial Interaction Videos*



*c) Third Interaction*



- Voice Assistant/Website Trial Interaction Videos



**STUDY 2**  
**Shopping Decision Study**

We would like to understand consumers' purchase decision-making process.  
You will read a scenario that describes a specific situation.

Please pay attention to the scenario and  
**imagine yourself in the situation** described in the scenario.

*Read this scenario carefully and imagine yourself in the situation:*

It was one of your typical days.  
Your friend called you in the evening and asked  
whether you wanted to **go to the beach next weekend**.  
You **agreed** to join and started to think what to bring to the beach.  
While going through your closet, you realized that your "**Beach Mat**" was **too  
sticky and rusty** from last year's beach party.

*Read this scenario carefully and imagine yourself in the situation:*

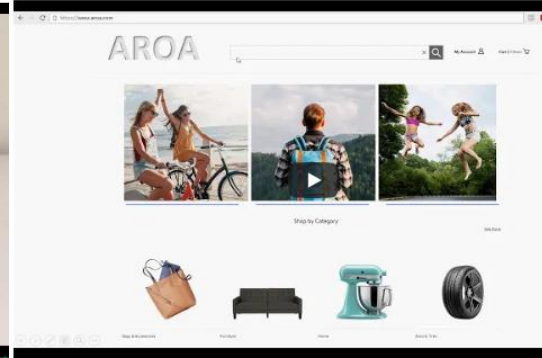
You decided to order a new "**Beach Mat**" right away  
so that you don't forget to buy them later this week.  
You decided to purchase the Beach Mat  
using a **Voice Assistant (Aroa)** you have at home.



Please imagine that you are the one conducting the research:  
Imagine that you are saying the sentences shown below.



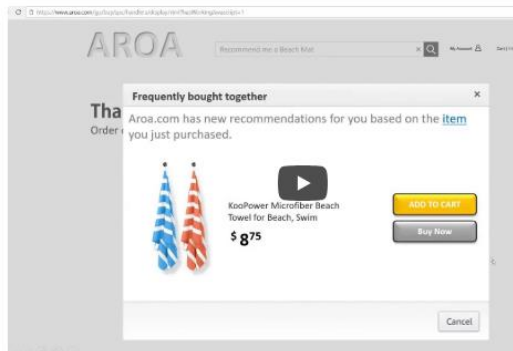
Please imagine that you are the one conducting the research:  
Imagine that you are saying the sentences shown below.



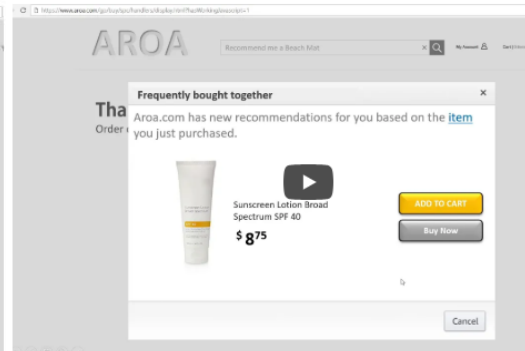
The scenario continues. Read carefully and imagine yourself in the situation:

You did some more research on this website,  
but in the end, decided to purchase the product that you initially had in mind.  
As you are purchasing the product, you receive the following  
recommendation.

Please imagine that you are the one conducting the research.  
Please pay close attention to what is displayed in the video:



Please imagine that you are the one conducting the research.  
Please pay close attention to what is displayed in the video:



Please imagine that you are the one conducting the research.  
Please pay close attention to what is displayed in the video:



Please imagine that you are the one conducting the research.  
Please pay close attention to what is displayed in the video:



What is recommended?

Do you like the recommended product?

Dislike a great deal	Dislike a moderate amount	Dislike a little	Neither like nor dislike	Like a little	Like a moderate amount	Like a great deal
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

What is your impression of the recommended product?

Extremely bad	Moderately bad	Slightly bad	Neither good nor bad	Slightly good	Moderately good	Extremely good
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

What are your thoughts on the quality of the product?

Far below average	Moderately below average	Slightly below average	Average	Slightly above average	Moderately above average	Far above average
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

What is your degree of confidence that the recommended product would work as intended?

Extremely doubtful	Moderately doubtful	Slightly doubtful	Neither confident nor doubtful	Slightly confident	Moderately confident	Very confident
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

How likely are you to buy the recommended product?

Extremely unlikely	Moderately unlikely	Slightly unlikely	Neither likely nor unlikely	Slightly likely	Moderately likely	Extremely likely
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

How much are you willing to pay for the recommended product?

max (\$)

The following questions are about how you think of the Voice Assistant, AROA.

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
I would like to compare my ideas with what the voice assistant says.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Interacting with the voice assistant make me feel comfortable, as if I am with friends.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If the voice assistant was a human, I imagine the voice assistant to be a natural, down-to-earth person.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would like to hear the opinion of the voice assistant in my home.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
The voice assistant will keep me company while I use it.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I look forward to using the voice assistant again.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When the voice assistant responds to my request, it seems as if the voice assistant understands the kinds of things I want to know.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If there were a story about the voice assistant in a newspaper or magazine, I would read it.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
I would miss using the voice assistant if I can't use the voice assistant because it is being repaired.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Please select "strongly agree"	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I think the voice assistant could be like an old friend.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I find the voice assistant to be attractive.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

In general, I would describe the voice assistant (AROA) as...

Fake	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Natural
Machine-like	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Human-like
Unconscious	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Conscious
Artificial	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Life-like

Please, type in your **age**.

What is your **sex**?

- Male
- Female

What is your **ethnicity**?

- Caucasian
- African American
- Asian
- Latino/Hispanic
- Native American
- Other

**Information about income is very important to understand. Would you please give your best guess?**

Please indicate the answer that includes your entire household income in (previous year) before taxes.

- Less than \$10,000
- to \$10,000 to \$19,999
- to \$19,999 to \$29,999
- to \$29,999 to \$39,999
- to \$39,999 to \$49,999
- to \$49,999 to \$59,999
- to \$59,999 to \$69,999
- to \$69,999 to \$79,999
- to \$79,999 to \$89,999
- to \$89,999 to \$99,999
- to \$99,999 to \$149,999
- to \$149,999 or more

The following are the questions related to the **Add-on Product**, the Sunscreen.

What is your evaluation of a **Sunscreen** in general?

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
It is <b>important for me to "see"</b> a sunscreen to evaluate how well it will perform	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is important for me to <b>"touch"</b> a sunscreen to evaluate how well it will perform	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is important for me to <b>"hear"</b> a sunscreen to evaluate how well it will perform	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I can adequately evaluate a sunscreen <b>only using information provided by the retailer or manufacturer</b> about the product's attributes and features	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I can evaluate the quality of a sunscreen <b>simply by reading information about the product.</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

How **Realistic** were the videos you viewed throughout this survey?

- Far below average
- Moderately below average
- Slightly below average
- Average
- Slightly above average
- Moderately above average
- Far above average

**Do you or your housemate own a Voice Assistant? (e.g., Amazon Echo, Amazon Dot, Google Home, Google mini...).**

Please be honest.

You will still receive credits for participating regardless of your answers.

- Yes
- No
- Used to

What is the device that you currently own/have owned? (e.g. Amzon Echo, Amazon Dot, Google home...)

---

How long have you been using/have used your voice assistant for? (in months)

How often do you use the Alexa/Google? (in average)

More than 4 times a day   2-3 times a day   Once a day   Once a week   Once in two weeks   Once in a month   Other

**This is the end of this survey.  
Thank you for participating in this study.**

Click Next to find the "Turk Code" to receive compensation.