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The effect of chatbots tone of voice on trust and customer satisfaction

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Abstract

In the past, contacting a company took quite a lot of effort, i.e. calling the company or writing an email and waiting for its response. Calling the company was not always free and email responses took quite a lot of time. Chatbots solved this problem and are nowadays an important communication tool between customers and businesses. However, there is no empirical knowledge available about the tone of voice of a chatbot and the effect on customers' trust and satisfaction. This research is conducted examine the effects the four types of tone of voice (formal, casual, enthusiastic and funny) have on customers' trust and satisfaction. A survey experiment is conducted to gather the data needed for this research. A within subjects design is used. Results found that the four levels of tone of voice significantly differ from one another. Casual tone of voice has the highest impact on trust and customer satisfaction, both individually as well as combined, followed by formal, enthusiastic and funny. This study also explored the possible moderating effects of age both, on trust and on satisfaction. Results show that there is no moderating effect of age.

Keywords: chatbot, chatbot personality, human-robot interaction, customer engagement, customer satisfaction, trust, linguistics, Nielsen Norman group, digital natives, digital immigrants, millennials

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1. Introduction

More and more customers spend time in digital environments and are buying online more than ever before (Statista, 2019ab), since it has some serious advantages (Kim, Ferrin & Rao, 2008; Choudhury and Karahanna, 2008; Liu et al. 2012). For instance, online shopping enables customers to purchase products and services at any time and it is not location-based. However, customers feel often confused when facing an online purchasing decision with possible risks and benefits (Chen, Yan, Fan & Gordon, 2015). Therefore, present-day customers expect more from sellers, particularly in the ecommerce context (Nisar & Prabhakar, 2017). According to Cui et al. (2017), companies try to create a great customer service experience, since it is one of the main factors that generate income and revenue. However, customer service is often associated with poor accessibility and high costs, because staff usually receive repetitive questions asked by several customers at any time, which can be cost-effectively answered by machines. Therefore, implementing a chatbot could possibly reduce the costs of customer service (Kowatsch et al., 2017) and increase the end-to-end user experience in terms of online shopping. Moreover, Pavlou, Liang and Xue (2007) argue that customer behavior in an ecommerce context can be positively influenced by increasing the perception of interactivity, considering that customers feel the helpfulness of the ecommerce website. However, there is little empirical knowledge how chatbots are used in everyday settings (Luger & Sellen, 2016).

In this study the focus is on the ecommerce field, particularly high-end retail web shops. In consistency with prior literature, the author proposes that a chatbot contributes to the improvement of customers' perception of interactivity due to its bi-directionality and synchronized characteristics (Jiang, Chan, Tan & Chua 2010; Lowry, Romano, Jenkins & Guthrie 2009). With choosing the right tone of voice of a chatbot, trust and customer satisfaction might increase.

Nevertheless, the amount of studies particularly done about interactivity tools like for instance a chatbot combined with linguistics is relatively small. In particular, there is no scientific research about trust in chatbots based on the tone of voice and the relation with trust and customer satisfaction. Therefore, in this study the focus will be on the tone of voice of a text based chatbot. Hence, the central question of this paper is: *What are effects of tone of voice on visitors' trust and customer satisfaction when talking with a text based chatbot?*

In order to provide further guidance, several sub-questions are defined. The answers of these sub-questions will guide this research and contribute to answering the central research question which is stated above. The sub-questions are defined as follows:

Sub-questions:
- What is ecommerce?
- What is a chatbot?
- What is tone of voice?
- What is trust?
- What is customer satisfaction?
- Does customer satisfaction differ between the four types of tone of voices?
- Is there a moderating effect of age between the tone of voices and trust and customer satisfaction?
- What is the relationship between trust and customer satisfaction, is trust a mediating variable?

This research will therefore provide additional evidence and knowledge about a potential influence of chatbot linguistics on trust and customer satisfaction, and hence contribute to the science in e-marketing and communication field.

This paper is structured as follows. First, a theoretical framework is described, wherein the sub-questions will be answered and hypotheses are drawn through literature review. Second, the research methodology of performing this quantitative study is described. Third, the results of the questionnaire will be discussed based on statistical information. In the end, conclusions are drawn, limitations are highlighted and future research possibilities are suggested.

2. Theoretical Framework and Hypothesis Construction

In this section, the main concepts of this research will be further elaborated. It provides an overview of prior knowledge in the field of ecommerce, chatbots, linguistics, trust, customer satisfaction and age.

2.1 Ecommerce

Although the term ecommerce was introduced in the early 1990s (Turban et al., 2008), there is not yet a generally accepted definition. This is due to the fact that some researchers and practicers (Tsalgatidou & Pitoura, 2001; Tian & Stewart, 2007) see the term ecommerce and e-business as synonyms, whereas ecommerce is an important part of e-business (Constantinides, 2006). According to Yang and Shi (2016) ecommerce is a business activity which consists of online buying and selling of goods, services and information through the internet rather than via physical exchanges. Likewise, Turban et al. (2008) defined ecommerce as "the process of buying, selling, or exchanging products, services, or information via computer networks (p.4)". More simply, ecommerce is buying and selling goods online (Jackson, Harris & Eckersley, 2003). Others defined ecommerce as the use of technology toward the automation of business transaction and workflow (Kalakota & Whinston, 1997) and assisting the progress of communication and information exchange (Min & Galle, 1999). However, according to Scupola (2009), ecommerce is not only buying and selling through electronic means. She emphasizes that ecommerce also involves other activities to support sales and includes any form of conducting commercial activities through electronic means which could span from scope of information about the product to buying or selling products of services. Delone and Mclean (2004) define ecommerce as any economic transaction where the buyer and seller come together through the internet, form a contractual agreement regarding the pricing and delivery of particular goods or services, accomplish the transaction through making payments and delivery of goods and/or services as contracted. From a different point of view, Vladimir (1996), defines ecommerce as "the sharing of business information, maintaining business relationships, and conducting business transactions by means of telecommunications networks." He further points out that ecommerce includes not only buying and selling goods and services, but also includes processes within individual organizations that support that goal. Additionally, Constantinides (2006) remarks that the definition of ecommerce should not only be limited to internet-enabled transactions, because transactions form merely a fraction of the commercial activities taking place online. Therefore, in line with Zwass (1996), Constantinides (2006) defines ecommerce

as web - based technologies, tools, business processes and activities which are supporting, improving, supplementing or replacing traditional commercial (and non- commercial) practices. Such practices include marketing, logistics, procurement or financial transactions to name the most important ones (Constantinides, 2006).

For this study, the definition by Constantinides (2006) has been adapted to because it is much more comprehensive than the other definitions as it is not only limited to internet-enabled transactions, but it takes the whole process behind a website into account.

2.1.1 History of ecommerce

Fuller and Li (2006), Chaffey, Chadwick-Ellis, Johnson and Mayer (2006) and Turban et al. (2008) all claim that the internet started as an experiment by the U.S. government in the late 1960s and initially used by academic researchers and scientists in order to facilitate the academic and scientific research. After the introduction of the internet, another innovation was launched, known as Electronic Data Interchange (EDI), which allowed organizations to purchase or send invoices electronically using standard procedures and documents (Turban, King, Lee & Viehland, 2004; Papazoglou & Ribbers, 2006, as cited in Weerasinghe, 2010). Later, in the 90's, the rapid evolution of ecommerce became possible when the Internet was opened to commercial use and people began flocking to participate in the World Wide Web to share and exchange information, which in turn has led to the dot-com bubble (Turban, King, Lee, Liang & Turban, 2015). During the dot-com bubble, companies' shares took values from nothing to billions in the late 1990's (Epstein, 2004). Some investors made hundreds of millions of dollars. However some investors lost their dollars just as quickly (Epstein, 2004). The burst of the dot-com bubble occurred in 2001 (Kalyanam & McIntyre, 2002) and led to a drop of stock price of companies, like Amazon by 29,9%, Ebay by 27.9% and Internet Capital by 72.1% (Cassidy, 2002). Between 2000-2001, already in San Francisco Bay Area, 80% of dot-coms went out of business, which led to a loss of 30,000 jobs directly related to the internet (Nevaer, 2002). Nevertheless, according to Becker (2007), the dot-com burst did not lead to a decrease in ecommerce sales. After the burst, ecommerce continued to grow steadily. Some companies that survived the crash, have become very successful, for instance Amazon, Ebay and Wal-Mart (Becker, 2007; Turban et. al, 2015). With introducing Web 2.0 (O'Reilly, 2005), social media platforms rose and paved the way for social commerce (Wang & Zhan, 2012). This led to a shift in power from companies to consumers (Carpenter, 2013). Another breakthrough occurred

when Apple introduced the iPhone in 2007, this innovation made mobile commerce (better known as m-commerce) possible (Kotler & Keller, 2012) and multichannel (Lev, Weitz & Grewal, 2013) or omni-channel retail strategies with intermediated channels (Burt & Sparks, 2003).

2.1.2 Advantages of Ecommerce:

Ecommerce led to the rapid internationalization of small and medium-sized enterprises by reducing the benefits of economies of scale, lowering the cost of advertising and enabling small firms to become easily a player in international business (Quelch & Klein, 1996). According to Janal (1998) and Korgaonkar, Petrescu and Becerra (2014), benefits of ecommerce for consumers are that consumers can easily order goods 24 hours a day and 7 days a week without wasting valuable time traveling to and from retail companies, receive relevant and detailed information about companies, products, competitors and prices more easily than ever before, get a wider product selection from many vendors and conduct quick comparisons with a few clicks. Furthermore, ecommerce facilitates competition, which in turn leads to substantial discounts. Besides consumers, ecommerce has also benefits to marketers (Shama, 2001), like easily adjust marketing strategies by altering their product assortment, prices, distribution, and promotion to address different target groups in a timely and suitable manner. Another benefit for marketers is that it has lower costs, since advertising on the internet costs less than advertising on print or television depending on the intricacies and extent of the advertisement (Goel, 2007). According to Janal (1998), ecommerce makes it more easy to learn and gain information about current and potential customers visiting their websites. Such information can be accessed in order to refine the marketing mix and adjust marketing strategies. An advantage to society is that ecommerce enables people in the underdeveloped countries and rural areas to enjoy products and services which otherwise are not available to them (Goel, 2007). Another advantage for society is that ecommerce simplifies delivery of public services (i.e. education and handling of government social services) at a lower cost and/or improved quality (Torres, Pina & Acerete, 2005).

2.1.3 Threats of ecommerce

The majority of countries try to make ecommerce more reliable by introducing and maintaining regulations since anyone with good or bad intentions can start a business (Yapar, Bayrakdar & Yapar, 2015). According to Rajaraman (2009), hackers are waiting for opportunities to attack

ecommerce websites, services and payment gateways. Businesses could lose revenue when their website or the payment systems they offer are down, and consequently customers can distrust that particular ecommerce website. On the one hand, customers are not able to experience (i.e. see, tough, feel, hear, taste and smell) a product before purchasing, there is no guarantee of product/service quality and/or products/service delivery (Niranjanamurthy, Kavyashree, Jagannath & Chahar, 2013), whereby dissatisfaction could lead to expensive returns (Morley & Parker, 2004). On the other hand, owning an ecommerce website means more rivalry, since customers have more retail options to choose than offline businesses and can easily switch between ecommerce websites. Nevertheless, these are barriers for ecommerce website owners that can be overcome with an appropriate strategy. For this reason, it is necessary to have a deep knowledge about electronic tools that are available to improve an ecommerce business, making a business stand from its rivals and, in the meantime, keeping it reliable and trustworthy to customers.

Conclusion:

Since ecommerce has such a strong effect on consumer behavior, it is important for companies to understand and correctly use this particular channel in order to generate the best possible results. Whereby knowing how to leverage and develop a good ecommerce website combined with its promotional activities may lower business costs and, in the meantime, may increase profit and return on investment.

2.2 Chatbot

First, the definitions of a chatbot will be elaborated on. Then the history will be explained in more detail. Subsequently, the chatbot personality will be discussed. Finally, the context, benefits and threats are highlighted.

2.2.1 Definition of a chatbot

A chatbot, also called machine conversation system (Shawar & Atwell, 2005), human-computer dialogue system (Yuan, Moore & Grierson, 2008), dialogue system (Lee, Jung, Kim & Lee, 2009), virtual agent (Róspide & Puente, 2012), and chatterbot (Tan, Duan & Inamura, 2012), is a computer program that is designed to respond like an intelligent entity through text-based (Khanna et al., 2015; Coniam, 2008) or voice based conversations (Khanna et. al., 2015). The underlying mechanism of most chatbots contains an algorithm which look through keywords in the user's input and then replies with text (Coniam, 2008) or voice from a programmed database (Dale, 2016). This means that the strength of a chatbot could be directly measured by the quality

of the output selected by the chatbot in response to the user (Ahmad & Singh, 2016). According to Shawar and Atwell (2005) a chatbot is "a machine conversation system which interacts with human users via natural conversational language" (p. 489). Interaction with these applications are primarily to engage in small talk (Hill, Ford & Farreras, 2015; Shawar & Atwell 2005). Others defined a chatbot as "a conversational agent that interacts with users in a certain domain or on a certain topic with natural languages" (Wu, Wang, Li & Li, 2008, p. 242). In more detail, a chatbot is a software intelligent communication tool that simulates human-like conversation by allowing users to type questions and, in return, try to generate relevant answers to those questions (Crutzen, Peters, Portugal, Fisser & Grolleman, 2011). A chatbot determines the meaning of a user's input [question such as, "Do you know if the shoes sizing of Enzo Bonafe button boots can be compared to that of Edward Green model Galway?] and links this question to a message in the database with possible responses [answers like "Yes, the button boots of Enzo Bonafe have a last 804 and that is similar to the last of Edward Green model Galway"] (Abdul-Kader & Woods 2015). In the continuation of this research, the author of this paper defines a chatbot as: "*an intelligent software program that links keywords from user's input (text or voice) to a database and in turn gives information in natural language (text or voice)*". Whereby the focus in this study is on text based chatbots.

2.2.2 Historical background

The first chatbot, called ELIZA, was created in 1966 by Weizenbaum, a MIT professor, and became an inspiration for computer science and linguistic researchers with building a computer function that can understand and respond to human language (Lokman & Zain, 2010). However, ELIZA held no memory of the conversation and hence could not achieve any form of targeted collaboration or negotiation (Jia & Chen, 2009). The huge breakthrough in chatbot technology came in 1995 when ALICE (Artificial Linguistic Internet Computer Entity) was introduced by Dr. Richard Wallace, an ex-Professor of Camegie Mellon University (Lokman & Zain, 2010). ALICE, the modern ELIZA, is a three times winner of Loebner's annual instantiation of Turing's Test for machine intelligence (Shah, 2006). This particular technology might be mature already since another chatbot called "Cleverbot" (introduced in 1999) is almost indistinguishable from humans. Of the 1334 volunteers who participated in a four minute during conversation with either Cleverbot or real humans, 59% rated Cleverbot as human while 63% rated the real humans as human (Aron, 2011, retrieved from Hill, Ford & Farreras, 2015), suggesting that Cleverbot is one of the most advanced and human-like chatbots available to the

public. Unlike most chatbots, Cleverbot's responses are not pre-programmed. Nowadays, the most visible chatbot technologies are the (voice-driven) digital agents like Siri, Cortana, Alexa and Google Assistant (Dale, 2016). According to Candello, Pinhanez and Figueiredo (2017) it becomes harder for users to distinguish chatbots from real human beings. Gartner (2017) even assumes that 85% of customer online interactions will be managed without a human by 2020. No information has been found whether this claim is true or not until today. Despite the popularity of chatbots, there is less scientific information about the interaction between a human and a chatbot, in particular from a linguistic perspective. In brief the breakthroughs of chatbot technology are shown below in figure 1.
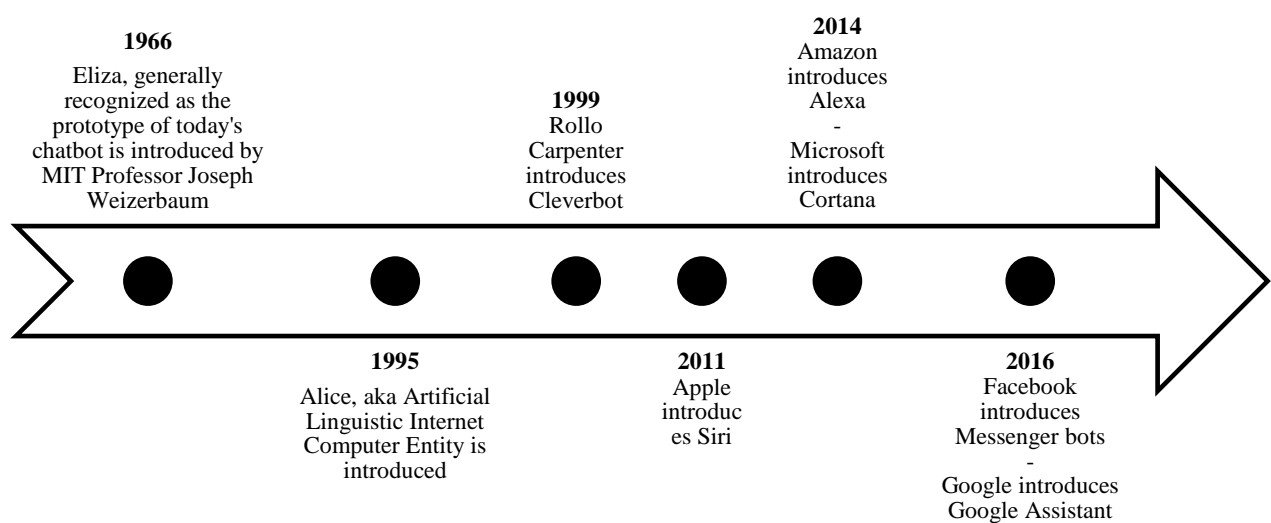
1966
Eliza, generally recognized as the prototype of today's chatbot is introduced by MIT Professor Joseph Weizerbaum

1999
Rollo Carpenter introduces Cleverbot

2014
Amazon introduces Alexa
-
Microsoft introduces Cortana

1995
Alice, aka Artificial Linguistic Internet Computer Entity is introduced

2011
Apple introduces Siri

2016
Facebook introduces Messenger bots
-
Google introduces Google Assistant

Figure 1: Breakthroughs in history of chatbots

2.2.3 The Operating of a Chatbot

On the one hand there are the Rule-based chatbots (the one used in this study). These chatbots are better known as the 'simple' chatbots (i.e. Lisa, the chatbot of ANWB.nl and Domino's Pizza Chatbot) and follow a predefined path which is created by a programmer (Kar & Haldar, 2016). When a user interacts with this type of chatbot, the chatbot usually reacts with buttons and keywords from which the user can choose to clarify his or her question in order to find a matching answer. Moreover, these simple chatbots can only perform a fixed number of pre-programmed tasks and therefore do not become smarter after each conversation (Candela, 2018). The main advantage of this type of chatbot is that they are cheaper and take less time to build, compared to chatbots that contain smarter technologies (Candela, 2018). On the other hand, there are the Smart chatbots (like Apple Siri, Amazon Alexa, Microsoft Cortana and

Google Assistant), those chatbots give the impression of being 'intelligent' since they not only contain predefined commands, but they are also capable of understanding natural language - they get smarter when they interact with users. The more interactions with a user, the smarter the chatbot becomes, thanks to the learning capabilities powered by machine learning (Das & Khan, 2018).

Practically, when a user makes a request through his mobile device or computer, the request is recorded by a Natural Language Parser and is translated into the programmed language of the conversation engine. Hereafter, the conversation engine analyses the input and forwards it to the backend. Then, several databases or information systems give the request to corresponding queries. After that, the chatbot links the given input to the database(s) in the backend. As soon as the appropriate result is received from the backend, the conversation engine forwards it to the response picker. Finally, the answer is translated into the natural language of the user and is sent to the user interface. Below in figure 2 an illustration of the operating of a chatbot.
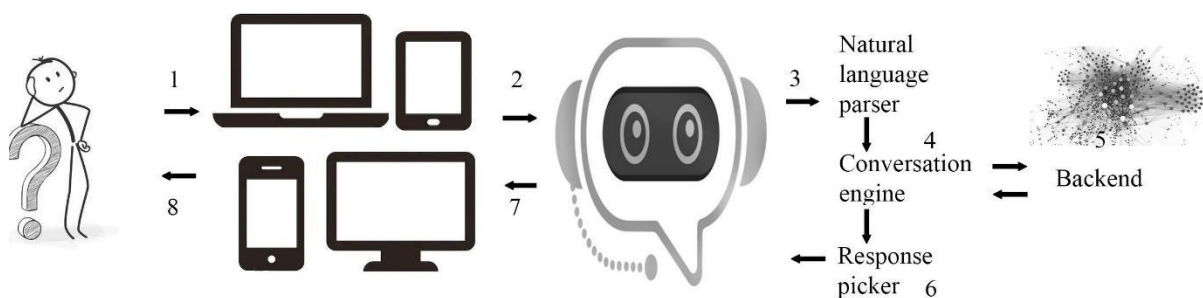

Figure 2: The operating of a chatbot

2.2.4 Context, benefits and threats

Chatbots have become increasingly sophisticated and are used within different fields and context, such as but not exclusively education (Bii, Too & Langat, 2013; Rosmalen, Eikelboom, Bloemers, Winzum & Spronck, 2012; Kerly, Hall & Bull, 2007), commerce (Thomas, 2016), entertainment (Atwell & Shawar, 2005) and the public sector (Bickmore, Schulman & Sidner, 2013). In an educational context chatbots are primarily used to improve the interaction between student and course content over the web (Heller, Procter, Mah, Jewell & Cheung 2005). In addition, chatting with a chatbot via the internet may be intrinsically more interesting than the same information presented on a standard format over the web (Heller et al., 2005). Researchers indicate that the benefits of chatbot technology use in educational contexts includes improved

learning, provision of an alternative means of content delivery, increased interest and motivation (Kowalski, Hoffmann, Jain & Mumtaz, 2011; Kerfoot et. al. 2006; Jia & Chen, 2009). Others used a chatbot for math education and find that allowing students to interact with a calculus chatbot adds to the variety of instructional tools (Knil, Carlsson, Chi & Lezama (2004). However, they underline that chatbots could only serve as amplifiers and cannot replace a good guide. Furthermore, chatbots in the public sector are used as institutional information agents in expos, museums, libraries, and healthcare in order to serve as virtual tour guides, virtual teaching assistants, student services agents for distance learners, and virtual health counselor (Bickmore, Schulman & Sidner 2013; Allison, 2012; De Gasperis, 2010; Rubin, Chen, & Thorimbert, 2010; Dent, 2007; Santangelo, Augello, Gentile, Pilato, & Gaglio, 2006; Jensen, Tomatis, Mayor, Drygajlo, & Siegwart, 2005; Kopp, Gesellensetter, Krämer, & Wachsmuth, 2005). Other benefits of chatbots are that they reduce stress, allow instant response and extend the service. Previously, contacting a company took quite a lot of effort, i.e. calling the company or writing an email and waiting for its response. Calling a company was not always free and email responses took quite a lot of time. Chatbots could solve this problem by being easily accessible, since they are 24/7 available and reply immediately, so customers get information promptly (Cui et al., 2017).

2.2.5 Chatbot challenges

Although chatbot technology has advantages, it also brings challenges. According to Abdul-Kader and Woods (2015), creating a chatbot is not easy, it needs a huge database in order to give reasonable answers to all questions asked by humans. Therefore, implementing IT infrastructure and chatbot technology requires investments for companies, which only pays off in the long term. Since chatbots are programmed by developers, they contain pre-programmed knowledge and will only give a valuable reaction if an input accords to an expected path from the database. Though chatbots perfectly deal with well-constructed questions, they are less able to deal with irony, sarcasm or humor. Hence, the output will either be relevant or irrelevant. Not providing a valuable answer leaves users unsatisfied (Tavanapour & Bittner, 2018). Furthermore, Gianvecchio, Xie, Wu and Wang (2011) argue that chatbots also distribute spam since the commercialization of the internet by sending unsolicited messages. Another issue is the privacy because some users are concerned about the input they share with the chatbot, since most of the chatbot conversations are based on past human conversations (Cui et al. 2017; Müller, 2016).

2.3 Tone of voice

2.3.1 Introduction

According to Sethi and Adhikari (2010), tone of voice refers to "the feelings created by words used to communicate a message" (p.90). Just as tone of voice is important in spoken communication, the tone of voice in written communication too affects the reader positively or negatively (Sethi & Adhikari, 2010). King and Moreggi (2007) have stated that emotional context is lacked in online messages and without emotional annotation, online communication could be ambiguous and lead to misunderstandings. Moreover, in a study about online communication, Smith, Masthoff and Tintarev (2016) rightly points out that this may be even more important in a situation whereby a person is communicating with a chatbot. In addition, Derks, Fischer and Bos (2008) argue that despite the absence of emotional annotation, computer mediated communication has been found to be able to communicate emotion as well as or even better than face-to-face communication. However, when a chatbot uses inconsistent or unexpected language, the conversation could sound unnatural and lead to frustration (Jain, Kumar, Kota & Patel, 2018; Duijst, 2017). For example, Duijst (2017) noticed that users found it strange that a 'financial advisor of a bank' (in fact a chatbot) used emojis in combination with formal language in a situation of urgency (a stolen bank card) and perceived not only the emoji as 'fake empathy', but the whole conversation. Therefore, finding the right balance in chatbots' tone of voice can result in higher customer satisfaction (Deshpande, Shahane, Gadre, Deshpande & Joshi, 2017) and trust (Muralidharan, 2014). Likewise, Kang (2006) argue that when interactions with service agents (i.e. chatbots) meet customers' expectations, the result is likely to be customer satisfaction and loyalty. Moreover, Toma (2010) argues that natural language in terms of textual information is a factor that evokes trustworthiness.

In early chatbot design, the focus was merely on producing coherent responses and using grammatically correct sentences (Reiter & Dale, 2000). Nowadays, more important is not only what is said by a chatbot, but also how it is expressed linguistically (Chaves, Doerry, Egbert & Gerosa, 2019). Users prefer chatbots that use language that is structurally correct and has a logical style (Jain, Kumar, Kota & Patel, 2018; Duijst, 2017; Gnewuch, Morana & Maedche, 2017).

The author of this thesis would like to contribute to the science by using the Nielsen Norman framework as basis to measure linguistics in this particular research.

2.3.2 Nielsen Norman Group

Nielsen Norman Group (n.d.) introduced a framework which they used to check whether the tone of voice of a website (i.e. written content, header etc.) is suitable to its products and customers. They designed a manageable web-specific tool that content strategists could use to create simple tone profiles for a company's online presence. Furthermore, they identified 4 primary tone of voice dimensions, which are funny vs. serious; formal vs. casual; respectful vs. irreverent; and enthusiastic vs. matter of fact (further elaborated in table 1). In a two-part study, they tested whether pairs of nearly identical website contents have suitable tone voices with their products and customers. They found that there are measurable effects of tone of voice on users, especially on users' impressions of an organization's friendliness, trustworthiness, and desirability.

Tone of voice dimension	Explanation
Funny vs. serious	Is the writer trying to be humorous? Or is the subject approached in a serious way?
Formal vs. casual	Is the writing formal? Informal/Casual?
Respectful vs. irreverent	Does the writer approach the subject in a respectful way? Or does (s)he take an irreverent approach?
Enthusiastic vs. matter-of-fact	Does the writer seem to be enthusiastic about the subject? Is the organization excited about the service or product, or the information it conveys? Or is the writing dry and matter-of-fact?

Table 1: Tone of voice dimensions

They considered an error message on a website to see what different effects those 4 dimensions could have. First a serious, formal, respectful and matter-of-fact error message is made: "We apologize, but we are experiencing a problem." With this tone, the writer does not try to make users laugh, or using any strong emotion in the message. Second, the message became a little

more casual by changing the error message into "We're sorry, but we're experiencing a problem on our end." Third, when adding a little more enthusiasm to the error message, it results in the following: "Oops! We're sorry, but we're experiencing a problem on our end." Last but not least, when adding more humor and little irreverence, the error message becomes "What did you do!? You broke it! (Just kidding. We're experiencing a problem on our end.)" Which tone of voice style works best, depends on the brand personality, the users and the context (Nielsen Norman n.d.).

This framework is adjusted (see table 2) and eminently suitable to apply on chatbot messages in order to see which tone of voice type is more preferred in which context.

Formal	Serious, formal, respectful, matter of fact
Casual	Serious, casual, respectful, matter of fact
Enthusiastic	Serious, casual, respectful, enthusiastic
Funny	Funny, casual, irrespective, enthusiastic

Table 2: Adjusted tone of voice dimensions

Based on the Nielsen Norman Group tone of voice dimensions, the following hypotheses are formed.

H1: Customer satisfaction differs between the four levels of tone of voice

A: A formal tone of voice has a more positive impact on customer satisfaction than casual has.

B: A formal tone of voice has a more positive impact on customer satisfaction than enthusiastic has.

C: A formal tone of voice has a more positive impact on customer satisfaction than funny has.

D: A casual tone of voice has a more positive impact on customer satisfaction than enthusiastic has.

E: A casual tone of voice has a more positive impact on customer satisfaction than funny has.

F: An enthusiastic tone of voice has a more positive impact on customer satisfaction than funny has.

H2: Trust differs between the four levels of tone of voice.

A: A formal tone of voice has a more positive impact on trust than casual has.

B: A formal tone of voice has a more positive impact on trust than enthusiastic has.

C: A formal tone of voice has a more positive impact on trust than funny has.

D: A casual tone of voice has a more positive impact on trust than enthusiastic has.

E: A casual tone of voice has a more positive impact on trust than funny has.

F: An enthusiastic tone of voice has a more positive impact on trust than funny has.

Since the quality of a website in terms of linguistics may also have an effect on trust (Nielsen Norman n.d.; Toma, 2010; Chang & Chen, 2008), the next paragraph is about trust.

2.4 Trust / E-trust

Trust has been broadly researched and analyzed by scientists across different academic areas; and various definitions have been proposed for the word of trust (Najafi & Kahani, 2016; Corritore, Marble, Wiedenbeck, Kracher & Chadran, 2005). The absence of a single definition of trust is simply due to the fact that its concept is mainly dependent on the field that is studied. Studies on trust span across many areas, like psychology, sociology, computer science and economics (McKnight & Chervnay, 2001). Trust in general is defined by Mayer, Davis, and Schoorman (1995) as follows:

> "the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party" (p. 712).

Particularly, trust becomes more important in situations whereby people feel vulnerable and are in an environment that has risks (Seckler, Heinz, Forde, Tuch & Opwis, 2015). In addition, Chellappa and Pavlou (2002) argue that trust is an important antecedent for a successful interaction with a customer and is more important online than offline because of the higher

level of uncertainty. Ecommerce trust (e-trust) can be formed when a customer believes in a sellers' honesty and trustworthiness in an online transaction (Corbitt & Thanasankit, 2003). Furthermore, Gefen (2000) defines e-trust as a customer's judgment that the e-seller is trustworthy and will fulfill what has been agreed on. Similarly, Shiau and Luo (2012) note that e-trust can generate a belief in an e-seller that leads to consumers' behavioral intentions. Moreover, e-trust not only depends on the perceived trustworthiness of the e-seller, it also depends on the reliability, usability, and functionality of the online channel (Grabner-Kraeuter & Kaluscha, 2003). Researchers underline that a lack of trust is the principal reason not to buy online (Vassilikopoulou et al., 2018). Moreover, trust is considered as a necessary condition for starting and expanding online exchanges and relationships (Grabner-Kraeuter & Kaluscha, 2003; Yoon, 2002), especially in circumstances where interdependence, uncertainty, and/or risk exist (Grabner-Kraeuter & Kaluscha, 2003).

Constantinides (2004) acknowledges that e- trust is a factor that is often associated with the failure or success of e-businesses; and its multi-dimensional character makes it a complicated problem. Therefore Constantinides (2004) presents the most important e-trust elements as "Transaction Security", Customer Data Abuse", "Customer Data Safety", "Uncertainty Reducing Elements" and "Guarantees Return Policy". Likewise, Oliviera, Alhinho, Rita and Dhillon (2017) argue that e-trust does not only emerge from personal and cognitive aspects, it is also affected by website experience aspects. Therefore, trust is an important factor to create, develop and protect a successful relationship between a customer and e-seller in order to have higher performance and profitability (Papadopoulou, Andreou, Kanellis & Martakos, 2001; Keen, Balance, Chan & Schrump, 2000).

In order to provide more confidence toward Internet, it is important to have trust-creating services (Baldwin, Beres, Mont & Shiu, 2001) and those services are considered as basic factors in the success of accepting ecommerce (Pennanen, 2009). Perhaps one of the most important findings is that improving e-service quality will improve customers e-trust (Chenet, Dagger & O'Sullivan, 2010; Mohd Kassim & Ismail, 2009; Shao Yeh & Li, 2009). However, Gul (2014) argues that trust precedes satisfaction, meaning that customers first need to trust the organization's services which, in turn, results in higher customer satisfaction. Similarly, Madjid (2013) explored the mediating role of trust in his study. Nevertheless, in this study trust is seen as the dependent variable since in a mediation model, the independent variable cannot influence the dependent variable directly (Baron & Kenny, 1989). For this study some measurement scales of Corritore et al. (2005), Gefen and Straub (2004), Jian, Bisantzand and Drury (2000), and Charalambous, Fletcher and Webb (2005) are combined and adjusted, which can be found

in Appendix B. Since some studies found a mediating role of trust, the following hypothesis is proposed:

H3 There is a positive relationship between trust and customer satisfaction.

2.5 Customer satisfaction

According to Merlo, Eisingerich and Auh (2014), customer satisfaction with a company's product(s) or service(s) is usually seen as the key for success and long-term competitiveness of a firm. Similarly, Cyr (2008) states that customer satisfaction is essential for companies to survive, especially in ecommerce businesses. Whereby the goal is on creating long-term relationships with its customers and sustaining a profitable future. To be more precise, when customers experience that products or services meet or even exceed their positive expectations, customer satisfaction is the case (Santini, Ladeira & Sampaio, 2018; Chiou & Droge, 2006). Similarly, Hult, Morgeson, Morgan, Mithas and Fornell (2017) define customer satisfaction as an overall assessment of the customer with respect to the customers' product and/or service. More broadly, Cengiz (2010) defined customer satisfaction as

> "the degree to which a customer perceives that an individual, firm or organization has effectively provided a product or service that meets the customer's needs in the context in which the customer is aware of and/or using the product or service" (p. 79).

In general, creating customer satisfaction has many benefits for organizations, since satisfied customers are less price sensitive, they are more likely to buy additional products, do not move easily to competitors and are loyal for a longer time (Thusyanthy & Tharanikaran, 2017). Therefore, Anderson and Sullivan (1993) state that companies that create high customer satisfaction levels, will profit from this reputation in the future. In online context, customer satisfaction might be indicated by their choice to continue browsing on a particular website without changing to other retailers (Chung, 2018). Furthermore, customer satisfaction is expected when salespersons give trustworthy, proper and detailed product information (Jian, Shi & Dalisay, 2014; Setia, Venkatesh & Joglekar, 2013), which in turn reduces uncertainty (Hutter, Hautz, Dennhardt, & Füller, 2013; Adjei, Noble, & Noble, 2010; Mohr & Sohi, 1995), and provokes positive attitudes toward service agents. However, businesses need to take in mind that a customer can in most cases easily switch to a competitor since the switching cost is low. Therefore it is crucial to keep the customer satisfied enough (Tax & Brown, 1998).

Especially in the business industry, chatbots have positively impacted customer satisfaction through their abilities to improve the customer service provided by a business as they seem flexible to the time and thus have the ability to offer customer needs anytime and anywhere (Haan, 2018). In this study measurement scales of Cronin, Brady and Hult (2000), Chiou and Droge (2006), Kirakowsky and Corbett (1993), and Chun, Ko, Young and Kim (2018) are combined and adjusted in order to measure customer satisfaction. The measurement scales can be find in Appendix B.
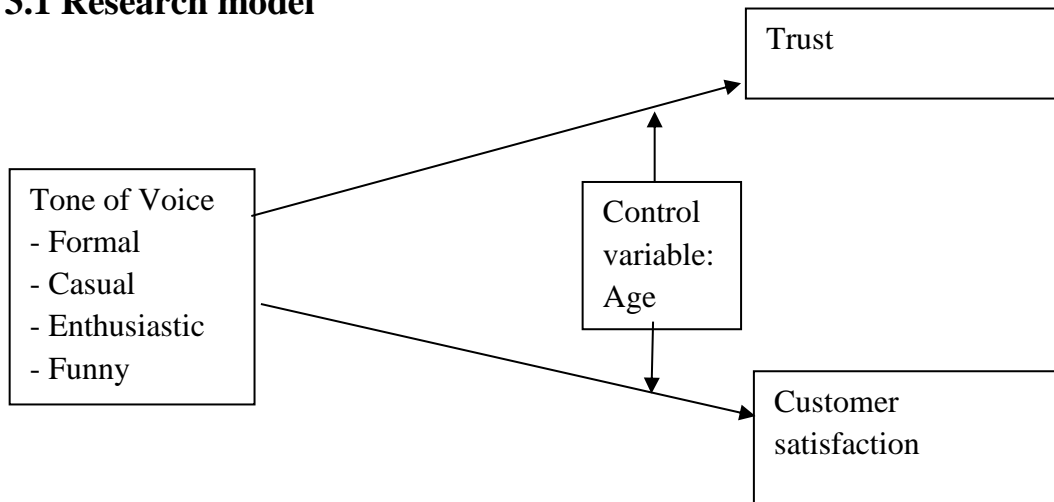
2.6 Age

Artificial intelligence has expanded dramatically in today's organizations. In order to be productive, these technologies must be accepted and used by customers and employees from organizations. Studies found significant differences in using technology between younger people and older people (Chung, Park, Wang, Fulk & McLauglin, 2010; Helsper & Eynon, 2010; Morris, Venkatesh & Ackerman, 2005). It is commonly believed that younger people have higher competencies and capabilities to use technology than older people (Nikou, Brannback & Widen, 2019). On the one hand, Prensky (2001) referred to people that were born after 1980 as "digital natives". Digital natives are also called 'Millennials, Internet Generation, Nintento Generation, Generation Y' in various studies (Taylor, 2012; Howe & Strauss, 2000). However, scholars do not agree on the exact birth year of digital natives. For instance, Howe and Strauss (2000) argue that digital natives are born in 1982. Moreover, digital natives have grown up with digital technology, whereby internet and mobile phones have always been a big part of their lives, hence they spend a considerable amount of time online and use the newest digital devices and services (Lamminman & Syrett, 2015; Prensky, 2001). On the other hand, Prensky (2001) referred to people born before 1980 as "digital immigrants". Since digital immigrants' abilities, interests and experiences differ mainly from digital natives, they may have different perceptions on presence and communication in an online environment (Felnhofer et al., 2014; Siriaraya & Siang Ang, 2012). Older adults are generally more reluctant and have a cautious attitude to try out new technologies (Chung et al., 2010). Based on the theory above, the following hypothesis is stated:

H4: The positive impact of Chatbots tone of voice on trust and customer satisfaction will be moderated by age, such that the effect will be stronger for digital natives than for digital immigrants.

3. Research methodology

3.1 Research model

```
                                    ┌──────────────────┐
                                    │ Trust            │
                                    └──────────────────┘
                                             ▲
┌──────────────────┐                         │
│ Tone of Voice    │        ┌──────────────┐ │
│ - Formal         │────────│ Control      │ │
│ - Casual         │        │ variable:    │ ▲
│ - Enthusiastic   │        │ Age          │ ▼
│ - Funny          │────────└──────────────┘ │
└──────────────────┘                         ▼
                                    ┌──────────────────┐
                                    │ Customer         │
                                    │ satisfaction     │
                                    └──────────────────┘
```

3.2 Research method

In order to show the usefulness and importance of linguistics of a chatbot, in this research, data is collected through an online survey, with help of Qualtrics. Most studies wherein information of respondents' values, attitudes, evaluations, opinions, feelings, preferences, expectations, status, occupation, education, income and behavior is considered rely on interviews and/or questionnaires. As a consequence, survey research is the most common used method for collecting data in Political Science, Sociology, Communication Science and Marketing Research (Saris & Gallhofer, 2007). Survey research is a method of systematic data collection, whereby people are asked questions by using standardized questionnaire es for the purpose of quantitatively analyzing a target population (Groves et al., 2011). According to Macer and Wilson (2014), web surveys rapidly evolved to become the prevailing type of survey data collection. Moreover, the author aimed also to find whether there were significant differences in preferred tone of voices between digital natives and digital immigrants. Therefore, this study can be seen as a descriptive research (Gay, Mills and Airasian, 2012). Since this study contains 4 variables that are measured on the same respondents, a repeated measures ANOVA is conducted on the data.

3.3 Data collection

Data is collected with Qualtrics. Since this research requires people who are browsing online and may talk with a chatbot, the focus was on respondents who are using online channels. Therefore, respondents are only approached through social media and online forums. Moreover,

the official language of the survey is set up in English. This is preferred over the option English or Dutch (respondents can switch) in order to prevent translation error and bias. With using snowball sampling, a high response rate is gained in 10 days. Respondents were approached via the authors network at university, mailing customer database, Stijlforum.nl, Linked-IN, Facebook and Twitter.

3.3.1 Databases used

The online libraries of the University of Twente and University of Leiden VPN connections were the primary databases that were used in order to gain relevant scientific information. Apart from that, search queries for this research were also performed through Google Scholar, Scopus, JSTOR, Researchgate, Web of Science and EBSCO Host.

3.3.2 Likert scale:

In the online survey, the answer possibilities consisted of a 5-point Likert scale, for instance from (1) "totally disagree" to (5) "totally agree", and were used for all measurements (except gender, education, age and manipulation check question). The choice was made to use a five point scale over a seven (or more) point scale since the more points an answer possibility has, the more difficult it will be to use on a mobile phone or device due to the limited screen space. In this way, irritation is prevented and a higher response is gained.

3.4 Bias and error

According to Bowling (2005) there are many aspects that can cause bias and error in a study via a questionnaire. In this study, in particular with the questionnaire, the focus was not only on relevant questions, but also on how they were asked in order to prevent bias and error. Thereby the four aspects of Bowling (2005) are used as a guide.

The first aspect that is taken into account in this study is "Item Wording". Hereby, the focus was on excluding unclear and badly worded items. There are two main types of Item Wording errors, namely Compound item and closed-ended questions. When having a statement like "I like the site navigation and the site speed", the statement can be divided into two separate questions, one about site navigation and one about the site speed. This is called compound item and could lead to confusion of a respondent (Bowling, 2005). Another error is prevented by focusing on closed-ended questions. With closed ended questions a respondent has the possibility to choose between fix ed answers (Bowling, 2005). This type of error occurs when

the respondent receives options which are not mutually exclusive. The following item illustrates this problem: "How often do you make purchases from b2c ecommerce websites? (1) once a year or less; (2) one to four times per month; (3) once per week or more." In this example, respondents who are making purchases between two-eleven times a year have no answer option, and a respondent who buys four times per month must choose between answer possibilities 2 and 3. Furthermore, in this study, there is extra emphasis on preventing double-negative construction, difficult vocabulary, or using vague terms like "recent" in this study.

The second aspect which could have a negative influence on the number of respondents and the way a respondent is filling in the survey is the length of the questionnaire (Bowling, 2005). In order to increase measurement reliability, researchers generally increase the number of items used. Therefore, surveys covering many constructs can become quite long and boring. It is a challenge to find a balance between the length of a survey and interest of the respondents. According to Bowling (2005), a pre-test can help finding whether the respondents find the survey boring and/or too long. Similarly, others argue that a pre-test can help finding error(s) and bias(es), with this, possible side effects might be prevented (Snijkers, 2002). In this study, 10 respondents were asked to give feedback about the questionnaire. And all shared the view that the questionnaire was not difficult nor too long, but contains vague terms. Moreover, some respondents emphasized that they need to read at least twice before they (might) understand the following statement in a right way: "I believe this chatbot will not act in a way that is disadvantageous for me". After the pre-test this is changed into "I believe this chatbot will act in a way that is disadvantageous for me". Hence double negative statement and confusion is prevented.

The third effect is called order effects. This phenomenon occurs when earlier items influence the responses to later ones. The concept of order effects suggests that presenting the questions/statements in a specific order can affect an individual's response. Another type of order effect occurs when surveys are too long. In this particular case, respondents may not be paying as much attention to the last questions as they did when they began. There are many techniques to deal with this and other order effects (Russell & Purcell, 2009; Bowling 2005). In this study order effects are minimized by beginning the questionnaire with less threatening items, clustering the questions and providing an uncluttered and easy to read questionnaire (Dooley, 2009; Bowling, 2005). Furthermore, clear instructions have been given to make the images readable during the questionnaire. Last but not least, all aspects from Dooley (2009) are taken into account in this study and are evaluated first with a pre-test.

3.5 Measurement scales

The questionnaire consists of questions with demographic information and of questions regarding a chatbot conversation, whereby participants are asked to answer statements based on a 5-point Likert scale. The measurement scales are written in detail in Appendix B..

Tone of Voice

To measure tone of voice in an online environment, Nielsen Norman Group (n.d.) framework is used as basis and is further elaborated. As the dependent variable, tone of voice is divided into 4 types, respectively: Formal, Casual, Enthusiastic and Funny.

Trust

The dependent variable trust is measured by combining and adjusting measurements instruments from different studies (Charalambous et al., 2015; Corritore et al., 2005; Gefen & Straub, 2004; Jian, Bisantz & Drury, 2000). The 4 trust items were measured on a 5-point Likert scale ranging from "1" being "Strongly disagree" to "5" being Strongly agree.

Customer satisfaction

The dependent variable customer satisfaction is measured by combining and adjusting measurements from various studies (Chun, Ko, Young & Kim, 2018; Chiou & Droge, 2006; Cronin, Brady & Hult, 2000; Kirakowski & Corbett, 1993). The 5 customer satisfaction items were measured using a 5-point Likert scale ranging from "1" being "Strongly disagree" to "5" being Strongly agree.

3.6 Validity

Writers distinguish between a number of types of validity. In this study the framework provided by Shadish, Cook and Campell (2002) is adhered to. According to their framework, quantitative research validity is divided into four major types: statistical conclusion validity, construct validity, internal validity, and external validity. Statistical conclusion validity controls whether the observed connection between the independent and dependent variables hold for the population for which the sample was drawn, or it is so small that it probably occurred by chance (Bowling, 2005). Inferential statistics can help judge this validity (Bowling, 2005). Construct validity refers to the degree to which the constructs in a research study reflect only or mainly the intended construct (Dooley, 2009). Internal validity has to deal with controlling whether the

observed impact on the outcome is due to the presumed cause or to some other variable or causal process (Bowling, 2005). Finally, external validity refers to the degree whether the finding(s) allow to generalize the outcome to other populations, places, and times (Bowling, 2005). According to Bowling (2005), if a research cannot be generalized, then the claims will be limited to the people or setting studied and to ask what unique factors help account for the results. To judge the overall validity of this study, each of these four types of validity are considered.

3.7 Reliability

Yin (2013) defines reliability as "a research should be repeatable". This means that definitions and descriptions should be in a manner that all methodologies are available and if the study is repeated in the same manner, similar results should be obtained. Within this study, all approaches and research designs are clearly formulated and made available. Furthermore, the evaluation criteria and references are all provided in the Appendix and Reference list. This study also presents the questionnaire in Appendix A & B. With this, the author hopes to clarify the way in which the study is carried out and with this, allow for any repetition. However, some information and/or results are excluded due to no usefulness.

Cronbach Alpha can be used to determine the internal consistency and is reliable if the Alpha is equal to or higher than 0.70. In this study the Cronbach's Alpha is respectively ,804 and ,822, see Appendix C 15. Therefore, it can be stated that the items have a relatively high internal consistency.

3.8 Manipulation check

A manipulation check is used in order to see whether the questions are filled in seriously or just randomly. The respondents were asked what kind of web shop is described in the questionnaire. Hence 3 respondents are excluded based on a wrong answer.

4. Results

This section will give more insights in the collected data through statistical analysis.

4.1 Data analysis

In total 213 participants started the survey through Qualtrics. But, there were 8 respondents with incomplete answers, 3 respondents that gave a wrong answer at the manipulation question, 1 respondent below the age of 18, and 1 impossible fast completing the survey. Therefore, 13 respondents were excluded from the data. The remaining 200 respondents' data has been completely anonymous analyzed with SPSS and is shown below.

4.1.1 Descriptive statistics

In this study, demographic information like age, gender and education are retrieved first. Then statements about the tone of voice of the chatbot with respect to trust and customer satisfaction are filled in based on a 5 point Likert scale. Among the 200 remaining respondents, 145 (72.5%) were male and 55 (27.5%) were female. The age of the respondents is mostly between 18-39 (133), they are called digital natives. The remaining 67 respondents are 40+ years old and are called digital immigrants. Most respondents have a master's degree (44.5%) and the majority of the respondents (77%) has used a chatbot before. The descriptive statistics of the participants are attached in Appendix C 1/5.

4.1.2 Hypothesis testing

In this section, hypotheses are tested and the used tests are mentioned.

H1: Customer satisfaction differs between the four levels of tone of voice.

To test this hypothesis, an univariate test is conducted. This test shows that the sphericity assumption is violated (Sphericity DF1: 3, DF2: 597) - therefore the focus is on the Greenhouse Geisser result (DF1: 2,45, DF2: 457, F: 165, P: ,000). Based on these results, it can be stated that customer satisfaction highly significantly differs between the four levels of tone of voice. See table C6 in Appendix C for the univariate test results.

To test Hypotheses H1a/H1f and H2a/H2f a repeated measures ANOVA analysis is conducted with the results of the pairwise comparisons table (see Appendix C, table C7).

H1a: A formal tone of voice has a more positive impact on customer satisfaction than casual has. This hypothesis is tested - and it seems that casual tone of voice has a more positive impact on customer satisfaction than Formal has (P: ,0.13, Mean difference -,129). Therefore, this hypothesis is rejected.

H1b: A formal tone of voice has a more positive impact on customer satisfaction than enthusiastic has. Indeed, a formal tone of voice has a slightly (Mean difference ,040) more positive impact on customer satisfaction than enthusiastic has. However, this is not statistically significant (P: ,329). Therefore, this hypothesis is rejected.

H1c: A formal tone of voice has a more positive impact on customer satisfaction than funny has. Results show that there is a significant difference (P: ,000, Mean difference 1,271) between formal and funny tone of voice whereby a formal tone of voice has a more positive impact on customer satisfaction than funny has. Therefore, this hypothesis is accepted.

H1d: A casual tone of voice has a more positive impact on customer satisfaction than enthusiastic has. Results show that there is a significant difference (P: ,000, Mean difference ,285) between casual and enthusiastic tone of voice whereby a casual tone of voice has a more positive impact on customer satisfaction than enthusiastic has. Therefore, this hypothesis is accepted.

H1e: A casual tone of voice has a more positive impact on customer satisfaction than funny has. Results show that there is a significant difference (P: ,000, Mean difference 1,516) between casual and funny tone of voice whereby a casual tone of voice has a more positive impact on customer satisfaction than funny has. Therefore, this hypothesis is accepted.

H1f: An enthusiastic tone of voice has a more positive impact on customer satisfaction than funny has. Results show that there is a significant difference (P: ,000, Mean difference 1,231) between enthusiastic and funny tone of voice whereby an enthusiastic tone of voice has a more positive impact on customer satisfaction than funny has. Therefore, this hypothesis is accepted.

Customer satisfaction	Mean difference	P: SIG.	Hypothesis Accepted (x) or rejected (-)
H1a	-,245*	,013	-
H1b	,040	,349	-
H1c	1,271*	,000	x
H1d	,285*	,000	x
H1e	1,516*	,000	x
H1f	1,231*	,000	x

Table 3: Compact overview of results hypothesis testing customer satisfaction

H2: Trust differs between the four levels of tone of voice.

To test this hypothesis, univariate test is conducted. This test shows that trust highly significantly differs between the four levels of tone of voice (F: 173, P: ,000). See table C6 in Appendix C for further statistical information.

H2a: A formal tone of voice has a more positive impact on trust than casual has. This hypothesis is tested - and it seems that casual tone of voice has a more positive impact on trust than formal has. Therefore, this hypothesis is rejected.

H2b: A formal tone of voice has a more positive impact on trust than enthusiastic has. Indeed, a formal tone of voice has a slightly (mean difference ,125) more positive impact on trust than enthusiastic has. However, this is not statistically significant (p: ,349). Therefore, this hypothesis is rejected.

H2c: A formal tone of voice has a more positive impact on trust than funny has. Results show that there is a highly significant difference (p: ,000, mean difference 1,181) between formal and funny tone of voice whereby a formal tone of voice has a more positive impact on trust than funny has. Therefore, this hypothesis is accepted.

H2d: A casual tone of voice has a more positive impact on trust than enthusiastic has.
Results show that there is a highly significant difference (p: ,000, mean difference ,254)
between casual and enthusiastic tone of voice whereby a casual tone of voice has a more
positive impact on trust than enthusiastic has. Therefore, this hypothesis is accepted.

H2e: A casual tone of voice has a more positive impact on trust than funny has. Results
show that there is a highly significant difference (p: ,000, mean difference 1,310) between
casual and funny tone of voice whereby a casual tone of voice has a more positive impact on
trust than funny has. Therefore, this hypothesis is accepted.

H2f: An enthusiastic tone of voice has a more positive impact on trust than funny has.
Results show that there is a highly significant difference (p: ,000, mean difference 1,056)
between enthusiastic and funny tone of voice whereby an enthusiastic tone of voice has a more
positive impact on trust than funny has. Therefore, this hypothesis is accepted.

Trust	Mean difference	P: SIG.	Hypothesis Accepted (x) or rejected (-)
H2a	-,129*	,013	-
H2b	,125	,349	-
H2c	1,181*	,000	x
H2d	,254*	,000	x
H2e	1,310*	,000	x
H2f	1,056*	,000	x

Table 4: Compact overview of results hypothesis testing trust

H3 There is a positive relationship between trust and customer satisfaction. With an
ANOVA regression analysis, the relationship between trust and customer satisfaction is tested.
It appears that this is positively significant for all 4 variables. This hypothesis is therefore
accepted. See Appendix C table 8/11 for the SPSS output.

H4 The positive impact of Chatbots tone of voice on trust and customer satisfaction will be moderated by age, such that the effect will be stronger for digital natives than for digital immigrants. First, a mixed MANOVA test is used to test this particular hypothesis. When taking trust and customer satisfaction together, the differences between the four tone of voices are the same for digital natives and digital immigrants (p: ,346). After that, a Univariate test is conducted were both dependent variables individually are tested. The Univariate test shows that for trust (F: ,955, DF: 2,290, P: ,395) and for customer satisfaction (F: ,833, DF: 2,466, P: ,302) the differences between the four tone of voices do not significantly differ between digital natives and digital immigrants. There is no moderating effect of age, because the differences between the tone of voices do not significantly differ for digital immigrants and digital natives. See Appendix C, C12 for the Univariate test results and C13-14 for a graphical representation of the ages.

4.2 Other notable results

People who experienced a higher trust, also experienced a higher customer satisfaction with any of the tone of voices. Furthermore, results show that higher educated people have a higher customer satisfaction than lower educated people when looking at a funny tone of voice. Another remarkable result is that males have a lower customer satisfaction than females when looking at the funny tone of voice. Below in Table 4 an overview of the most important regression output (see for the SPSS regression output Appendix C table 8-11).

	Formal	Casual	Enthusiastic	Funny
Age				
Gender				-
Education	-			x
Trust	x	x	x	x

x = positive significant & - = negative significant

Table 4: Regression results compact overview

5. Conclusion, Limitations and Future research

5.1 Conclusion

The main research question was stated as: " *What are effects of tone of voice on trust and customer satisfaction at a text based chatbot?"*. This study shows that there are significant differences in the four types of tone of voices and its effects on trust and customer satisfaction, both, individually as well as combined. Although the author expected that formal would have the highest effect on trust and customer satisfaction, results show that a casual tone of voice has the highest positive effect on trust and customer satisfaction. A funny tone of voice has the lowest trust and customer satisfaction effect. Furthermore, people who experienced a higher trust, also experienced a higher customer satisfaction with any of the tone of voices. Therefore, there might be a mediating role of trust. However, this needs to be tested with a different research model. Furthermore, according to previous studies, the author expected a moderating effect of age because other studies showed that there are differences between digital immigrants and digital natives by using technologies. However, this study did not find a moderating role for age. This might be due to the fact that in this study not the technology as a tool is tested (i.e. working difficulty, appearance etc.), but the focus was only on the communication of the chatbot.

5.2 Limitations

Raosoft tool was used to calculate the required minimum respondents for an academic study. According to that tool, the minimum respondents number is 385. However, in this study the number of respondents were 213 (200 after eliminating), which is according to the Raosoft tool, a limitation. More respondents could be gained. However the time was limited. Another limitation could be type of scenarios used, since other scenarios might lead to different outcomes. Furthermore, the fact is that there is a disproportionate distribution of gender, since 72.5% were male and 27.5% were female. Besides that, the number of digital natives and digital immigrant respondents might also not be proportionate, the ratio is 133 digital natives versus 67 digital immigrants. Another limitation might be the fact that purchase intention is not included in this study. Researchers found namely that trust and customer satisfaction have a positive effect on purchase intention (Hsu, Chang & Chen, 2011). Furthermore, the respondents came mainly from the Netherlands. Therefore, the results are only applicable to the Netherlands, since according to Hofstede (2001), countries differ in terms of culture and therefore this may

affect the preferred tone of voice and may have different effect on trust and customer satisfaction.

5.3 Future research

Since this study found that there is a significant positive relation between trust and customer satisfaction, trust can be assumed as a mediating variable. Future research can provide more insights into the mediating role of trust, whereby a different research model should be applied and a MEMORE test can be useful to test the mediating effect. Besides age, future research can also look at gender as a control variable. Furthermore, future research might provide further evidence on the link with purchase intention and/or use different scenarios.

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Statista B: https://www.statista.com/statistics/534123/ecommerce-share-of-retail-sales-worldwide/

Appendix A: Questionnaire

This research is part of my master thesis at the University of Twente. You will read through a scenario text in which you have to imagine that you are talking with a chatbot (supported by images). Please take your time to read through the text carefully. The survey you are about to begin will approximately take 10 minutes of your time. In case that data will be given to third parties, this would be only anonymously and confidentially. Your participation in this study is voluntary and you can leave the survey without giving reasons. If you have any questions, please feel free to contact me at c.akcora@student.utwente.nl.

Thank you for participating in this research.

Caner Akcora

1.Age (fill in)

2. Gender

- **Men**
- **Women**

3. Education level

What is your highest degree or level of school you have <u>completed</u>?

o Elementary school

o High school graduate

o Bachelor degree

o Master degree

o Doctorate (e.g. PHD)

Other (please specify)

4. Have you used a chatbot before?

Questions about your order

Two days ago you have placed an order with number 215876 and are asking the chatbot: "What's the shipment status of order 215876"?

The chatbot replies with:

A: Apologies. The order will be checked and sent today.

B: We apologize. We'll check your order and send it today.

C: Oh, we are very sorry! Let's check it and send it right over to you.

D: So what…? Just joking! How stupid of us, very sorry! Let's check it and send it right over to you.

I am looking to a dress shirt with SKU number LB19 and want to know whether the shirt has mother of pearl buttons (this information is missing on the product page).

The chatbot replies with:

A: The shirt with SKU number LB19 has not mother of pearl buttons..

B: The shirt with SKU number LB19 hasn't mother of pearl buttons.

C: Hey! Well, I've checked immediately for you, that shirt hasn't mother of pearl buttons.

D: Do you know how expensive those are?! Just joking! That shirt hasn't mother of pearl buttons.

I see on your website a scarf of wool and another of wool-cashmere mix. Which one has a more soft fabric and does not peal?

The chatbot replies with:

A: There is no information available about this subject.

B: We didn't find any information about this.

C: Hmmmm….We tried but didn't find anything, sorry!

D: Let's check…..Oh no, brain error! Nothing found man!

___

A = Formal

B = Casual

C = Enthusiastic

D = Funny

_____

Please fill in how satisfied you are with the formal, casual, enthusiastic and funny <u>tone of voice</u> used in the chatbot response.

strongly disagree - disagree- neutral - agree - strongly agree

(Manipulation check:)

What kind of web shop is described in the questionnaire?

a) Online food shop

b) IT shop

c) Clothing shop

d) Gaming shop

Appendix B: The scale items:

Variable	Initial source	My measurement source
Trust		
	I trust this website (Corritore et al., 2005); I trust Travelocity.com (Gefen & Straub, 2004)	I trust this chatbot
	The system is deceptive (Jian, Bisantz and Drury, 2000)	In my experience this chatbot is not reliable (negative)
	I believe this website will not act in a way that harms me (Corritore et al., 2005)	I believe this chatbot will act in a way that is disadvantageous for me (negative)
	I trusted that the robot was safe to cooperate with (Charalambous et al., 2015)	I trusted that the chatbot was safe to cooperate with
Customer satisfaction	My choice to purchase this service was a wise one (Cronin, Brady & Hult, 2000)	My choice to use this chatbot was a wise one
	Overall, I am satisfied with the decision to use XYZ brand (Chiou & Droge, 2006)	Overall, I am satisfied with the decision to use this chatbot
	The shop assistant was very helpful (Kirakowski & Corbett, 1993)	I am not happy with the way the chatbot treated me (negative)
	I am satisfied with this service agent (Chun et al., 2017)	I am satisfied with the tone of this chatbot
	Using this software is frustrating (Kirakowski & Corbett, 1993)	Using this chatbot is frustrating (negative)

Appendix C: SPSS DATA RESULTS

C1: Descriptive statistics age groups

Between-Subjects Factors			
		Value Label	N
Agegroup	,00	digital natives	133
	1,00	digital immigrants	67

C2: Age Histogram
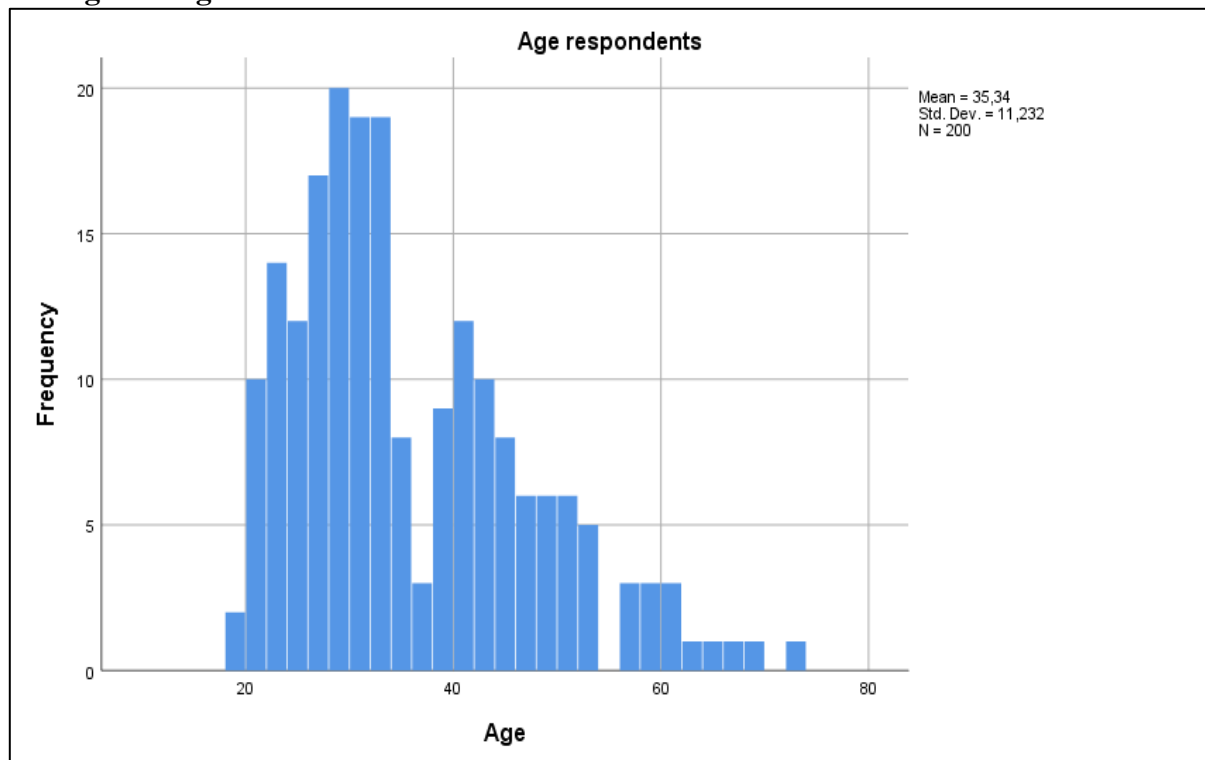
## C3: Descriptive statistics Gender

Gender					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	female	55	27,5	27,5	27,5
	male	145	72,5	72,5	100,0
	Total	200	100,0	100,0	

C4: Descriptive statistics Education

<table>
<tr><th colspan="6">Education</th></tr>
<tr><th></th><th></th><th>Frequency</th><th>Percent</th><th>Valid Percent</th><th>Cumulative Percent</th></tr>
<tr><td>Valid</td><td>Elementary school</td><td>5</td><td>2,5</td><td>2,5</td><td>2,5</td></tr>
<tr><td></td><td>High school</td><td>21</td><td>10,5</td><td>10,5</td><td>13,0</td></tr>
<tr><td></td><td>Bachelor degree</td><td>75</td><td>37,5</td><td>37,5</td><td>50,5</td></tr>
<tr><td></td><td>Master degree</td><td>89</td><td>44,5</td><td>44,5</td><td>95,0</td></tr>
<tr><td></td><td>Doctorate</td><td>10</td><td>5,0</td><td>5,0</td><td>100,0</td></tr>
<tr><td></td><td>Total</td><td>200</td><td>100,0</td><td>100,0</td><td></td></tr>
</table>

C5: Histogram Education
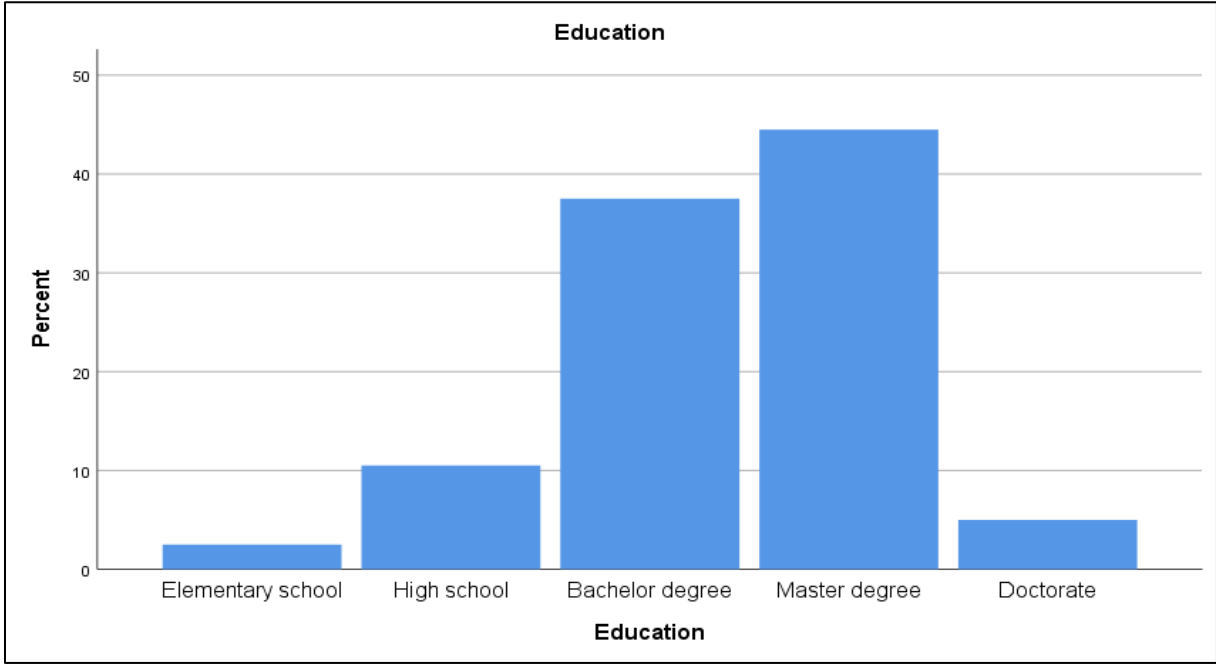
C6: Univariate test

Source	Measure		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Univariate Tests								
Toneofvoice	Trust	Sphericity Assumed	216,185	3	72,062	173,689	,000	,466
		Greenhouse-Geisser	216,185	2,298	94,075	173,689	,000	,466
		Huynh-Feldt	216,185	2,326	92,928	173,689	,000	,466
		Lower-bound	216,185	1,000	216,185	173,689	,000	,466
	Customersatisfaction	Sphericity Assumed	278,595	3	92,865	165,600	,000	,454
		Greenhouse-Geisser	278,595	2,453	113,575	165,600	,000	,454
		Huynh-Feldt	278,595	2,486	112,071	165,600	,000	,454
		Lower-bound	278,595	1,000	278,595	165,600	,000	,454
Error(Toneofvoice)	Trust	Sphericity Assumed	247,690	597	,415			
		Greenhouse-Geisser	247,690	457,306	,542			
		Huynh-Feldt	247,690	462,950	,535			
		Lower-bound	247,690	199,000	1,245			
	Customersatisfaction	Sphericity Assumed	334,785	597	,561			
		Greenhouse-Geisser	334,785	488,142	,686			
		Huynh-Feldt	334,785	494,692	,677			
		Lower-bound	334,785	199,000	1,682			

C7: Pairwised comparisons test

Pairwise Comparisons							
						95% Confidence Interval for Difference[b]	
Measure	(I) Toneofvoice	(J) Toneofvoice	Mean Difference (I-J)	Std. Error	Sig.[b]	Lower Bound	Upper Bound
Trust	1	2	-,129*	,041	,013	-,239	-,018
		3	,125	,066	,349	-,050	,300
		4	1,181*	,077	,000	,977	1,385
	2	1	,129*	,041	,013	,018	,239
		3	,254*	,060	,000	,095	,412
		4	1,310*	,074	,000	1,114	1,506
	3	1	-,125	,066	,349	-,300	,050
		2	-,254*	,060	,000	-,412	-,095
		4	1,056*	,064	,000	,887	1,226
	4	1	-1,181*	,077	,000	-1,385	-,977
		2	-1,310*	,074	,000	-1,506	-1,114
		3	-1,056*	,064	,000	-1,226	-,887
Customersatisfaction	1	2	-,245*	,051	,000	-,381	-,109
		3	,040	,081	1,000	-,176	,256
		4	1,271*	,081	,000	1,055	1,487
	2	1	,245*	,051	,000	,109	,381
		3	,285*	,076	,001	,082	,488
		4	1,516*	,083	,000	1,296	1,736
	3	1	-,040	,081	1,000	-,256	,176
		2	-,285*	,076	,001	-,488	-,082
		4	1,231*	,073	,000	1,037	1,425
	4	1	-1,271*	,081	,000	-1,487	-1,055
		2	-1,516*	,083	,000	-1,736	-1,296
		3	-1,231*	,073	,000	-1,425	-1,037
Based on estimated marginal means							
*. The mean difference is significant at the ,05 level.							
b. Adjustment for multiple comparisons: Bonferroni.							

C8: Formal

<table>
<tr><th colspan="7">Coefficients^a</th></tr>
<tr><td rowspan="3"></td><td rowspan="3">Model</td><td colspan="2">Unstandardized Coefficients</td><td>Standardized Coefficients</td><td rowspan="3">t</td><td rowspan="3">Sig.</td></tr>
<tr><td rowspan="2">B</td><td rowspan="2">Std. Error</td><td rowspan="2">Beta</td></tr>
<tr></tr>
<tr><td>1</td><td>(Constant)</td><td>,503</td><td>,216</td><td></td><td>2,323</td><td>,021</td></tr>
<tr><td></td><td>Amean_trust</td><td>,927</td><td>,046</td><td>,830</td><td>20,366</td><td>,000</td></tr>
<tr><td></td><td>Gender</td><td>-,048</td><td>,069</td><td>-,028</td><td>-,696</td><td>,487</td></tr>
<tr><td></td><td>Age</td><td>-,001</td><td>,003</td><td>-,015</td><td>-,360</td><td>,719</td></tr>
<tr><td></td><td>Education</td><td>-,101</td><td>,037</td><td>-,111</td><td>-2,708</td><td>,007</td></tr>
<tr><td colspan="7">a. Dependent Variable: Amean_cs</td></tr>
</table>

C9: Casual

<table>
<tr><th colspan="7">Coefficients^a</th></tr>
<tr><td rowspan="3"></td><td rowspan="3">Model</td><td colspan="2">Unstandardized Coefficients</td><td>Standardized Coefficients</td><td rowspan="3">t</td><td rowspan="3">Sig.</td></tr>
<tr><td rowspan="2">B</td><td rowspan="2">Std. Error</td><td rowspan="2">Beta</td></tr>
<tr></tr>
<tr><td>1</td><td>(Constant)</td><td>,187</td><td>,273</td><td></td><td>,685</td><td>,494</td></tr>
<tr><td></td><td>Age</td><td>,002</td><td>,003</td><td>,028</td><td>,609</td><td>,543</td></tr>
<tr><td></td><td>Education</td><td>-,028</td><td>,042</td><td>-,031</td><td>-,666</td><td>,506</td></tr>
<tr><td></td><td>Gender</td><td>-,060</td><td>,078</td><td>-,036</td><td>-,769</td><td>,443</td></tr>
<tr><td></td><td>Bmean_trust</td><td>,955</td><td>,058</td><td>,765</td><td>16,362</td><td>,000</td></tr>
<tr><td colspan="7">a. Dependent Variable: BMean_cs</td></tr>
</table>

C10: Enthusiastic

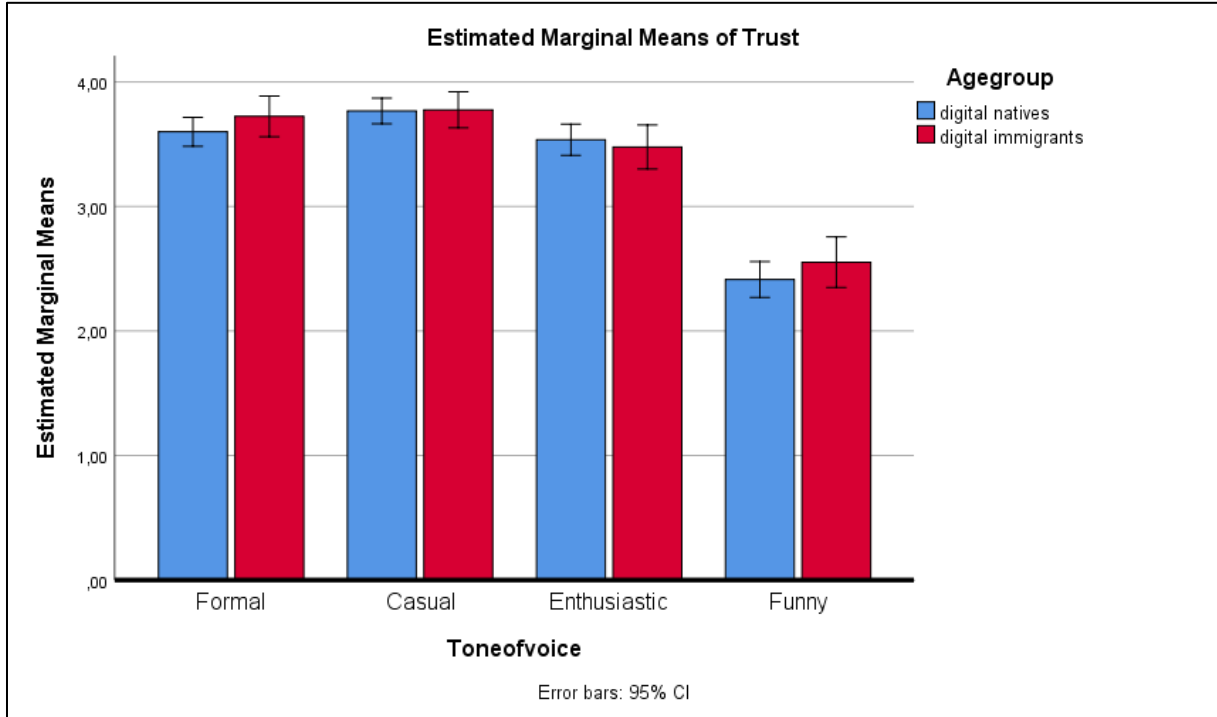|		Coefficients^a				
		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	,187	,250		,749	,455
	Age	-,003	,003	-,040	-,942	,348
	Education	,055	,043	,054	1,279	,202
	Gender	-,133	,080	-,070	-1,658	,099
	CMean_trust	,927	,049	,801	18,934	,000
a. Dependent Variable: CMean_cs						

C11: Funny

		Coefficients^a				
		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	,017	,241		,071	,944
	Age	,002	,004	,029	,608	,544
	Education	,109	,049	,106	2,208	,028
	Gender	-,183	,092	-,095	-1,990	,048
	DMean_trust	,758	,049	,743	15,546	,000
a. Dependent Variable: DMean_cs						

C12: Univariate test including Age Group

			Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Univariate Tests								
Source	Measure							
Toneofvoice	Trust	Sphericity Assumed	187,339	3	62,446	150,479	,000	,432
		Greenhouse-Geisser	187,339	2,290	81,817	150,479	,000	,432
		Huynh-Feldt	187,339	2,330	80,413	150,479	,000	,432
		Lower-bound	187,339	1,000	187,339	150,479	,000	,432
	Customersatisfaction	Sphericity Assumed	239,208	3	79,736	142,340	,000	,418
		Greenhouse-Geisser	239,208	2,446	97,793	142,340	,000	,418
		Huynh-Feldt	239,208	2,491	96,012	142,340	,000	,418
		Lower-bound	239,208	1,000	239,208	142,340	,000	,418
Toneofvoice * Agegroup	Trust	Sphericity Assumed	1,189	3	,396	,955	,414	,005
		Greenhouse-Geisser	1,189	2,290	,519	,955	,395	,005
		Huynh-Feldt	1,189	2,330	,510	,955	,397	,005
		Lower-bound	1,189	1,000	1,189	,955	,330	,005
	Customersatisfaction	Sphericity Assumed	2,038	3	,679	1,213	,304	,006
		Greenhouse-Geisser	2,038	2,446	,833	1,213	,302	,006
		Huynh-Feldt	2,038	2,491	,818	1,213	,303	,006
		Lower-bound	2,038	1,000	2,038	1,213	,272	,006
Error(Toneofvoice)	Trust	Sphericity Assumed	246,501	594	,415			
		Greenhouse-Geisser	246,501	453,367	,544			
		Huynh-Feldt	246,501	461,281	,534			
		Lower-bound	246,501	198,000	1,245			
	Customersatisfaction	Sphericity Assumed	332,747	594	,560			
		Greenhouse-Geisser	332,747	484,319	,687			
		Huynh-Feldt	332,747	493,306	,675			
		Lower-bound	332,747	198,000	1,681			

C13: Age Group vs. Trust

Estimated Marginal Means of Trust

Error bars: 95% CI

C14: Age Group vs Customer Satisfaction

Estimated Marginal Means of Customersatisfaction

Error bars: 95% CI