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### Persuasive agents

*Unraveling the persuasive potential of conversational agents*

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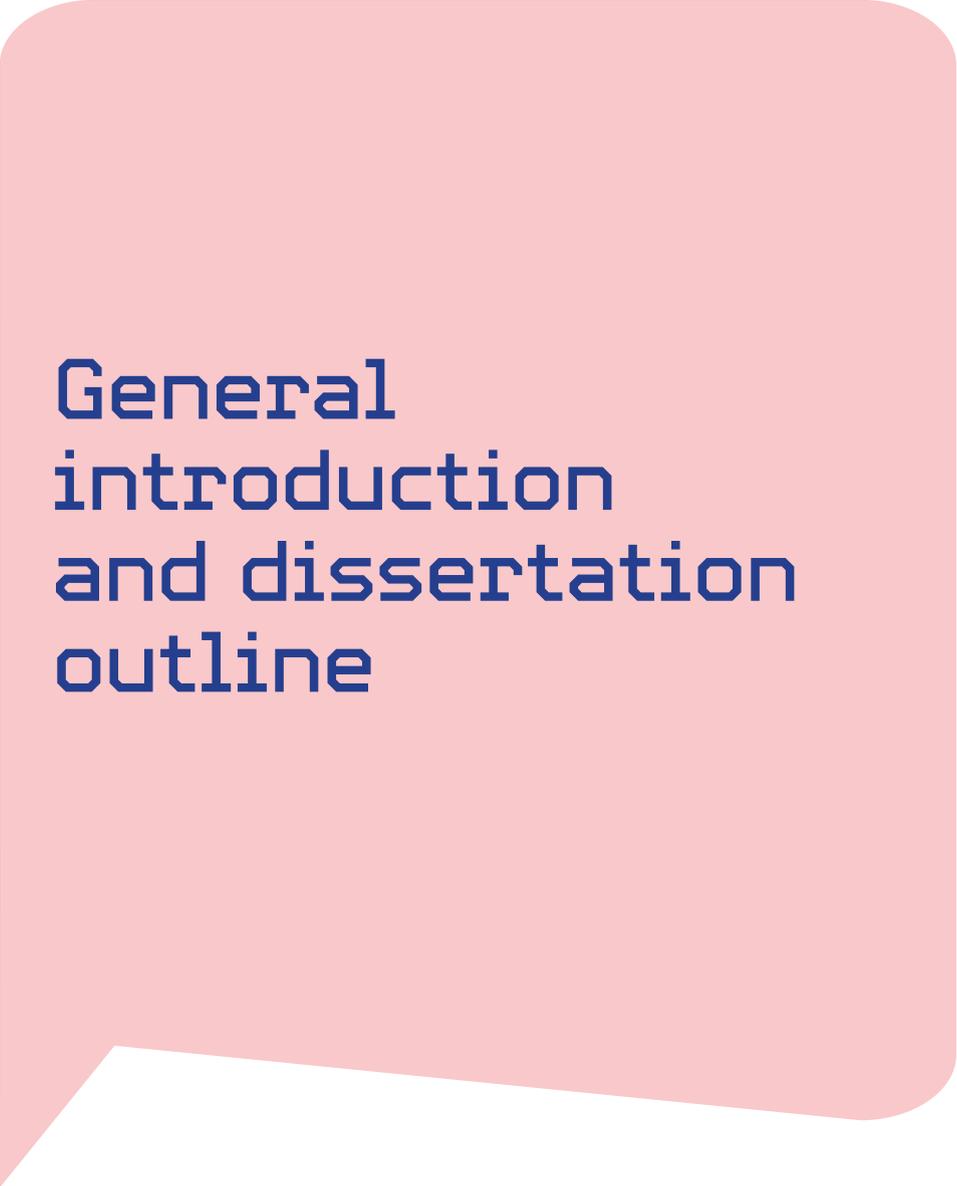
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# CHAPTER 1



**General  
introduction  
and dissertation  
outline**

Conversational agents are increasingly used by (commercial) organizations to allow for new types of consumer-brand interactions. Due to their conversational nature and possibly including more hidden types of advertising, these emerging technologies can potentially influence its users in more effective ways than other types of online media. However, little is known about the persuasive potential of conversational agents. Therefore, this dissertation aims to provide insights into (1) the persuasive consequences following from interactions with conversational agents in a brand communication context, (2) the possible underlying mechanisms explaining these effects, and (3) the short- and long-term dynamics of these effects.

## **Conversational agents are making their way into brand communication**

With advances in artificial intelligence and natural language processing, conversational agents – technologies that use natural language to interact with its users in a conversational manner (Griol et al., 2013) – are widely implemented. Commercial organizations have discovered the potential of conversational technologies. These technologies are available 24/7, deliver personalized attention to users' questions and requests, and help to guide users in a natural way (Accenture, 2018). Organizations have started to invest tremendously in conversational technology over the last years, and market predictions expect the global chatbot market to grow even further (Grand View Reserach Inc., 2021; Research and Markets, 2021).

While up to this date customer service agents are the most popular, many brands and commercial organizations show large interest in also implementing conversational agents in their sales and marketing strategies, if they are not even doing so yet (Accenture, 2018). Hence, conversational agents enter the branded sphere, meaning that they become an essential part of consumer-brand interactions. These efforts are already reflected in the number of users that interact with conversational agents from brands. A 2019 survey among the Dutch adult population found that 47% of the respondents had interacted with a brand-related conversational agent before (Araujo et al., 2019). The 2018 State of Chatbots report showed that 22% of US respondents predicted to use conversational agents to get ideas and inspirations for purchases (Drift, 2018).

With the implementation of conversational agents in brand communication, messages are specifically designed to not only inform, but also persuade consumers how to feel, think, and act upon the messages provided. Conversational agents can for example select and provide relevant and, in many cases, personalized recommendations and

choice sets (Hoyer et al., 2020) and suggest branded content to its users. By naturally embedding branded content in a conversation, persuasive messages are possibly perceived as less obtrusive than traditional advertising. If this is the case, the persuasive potential of conversational agents might become enormous. The conversational agent becomes a **persuasive agent**. This dissertation addresses the persuasive potential of conversational agents and expands our understanding of consumer responses and persuasion following from interactions with (branded) conversational agents.

## **Conversational agent research from ELIZA to Billie from Bol.com**

Conversational agents are around for more than five decades. Since their early days, they have been inspired by the challenge of passing the Turing test, a method to determine whether a machine can exhibit intelligent behavior. The first popular conversational agent was ELIZA, developed by psychologist Joseph Weizenbaum at MIT in 1966 (Weizenbaum, 1966), that was specifically designed to mimic human behavior. Early development of and empirical studies on conversational agents strongly focused on social conversational agents designed to behave like “real humans”, so that users fail to detect the existence of technology. One example is ALICE, one of the first conversational agents based on artificial intelligence markup language, which won the Loebner Prize in 2000, 2001 and 2004, an award for the most human-like computer program (Wallace, 2009). Social conversational agents still exist today, for example Replika (<https://replika.ai/>) or Kuki, formerly known as Mitsuku (<https://www.kuki.ai/>) which have been designed to be an AI-driven friend, and have received some scholarly attention (e.g., Croes & Antheunis, 2021).

In our current communication environment, conversational agents are used in many different contexts. Conversational agents have been developed and researched in several critical domains. These domains include, but are not limited to, health (Abd-Alrazaq et al., 2020; Laranjo et al., 2018) or elderly care (e.g., Ring et al., 2015), education (e.g., Crutzen et al., 2011; Fryer et al., 2019) and training (Bosman et al., 2019), or the provision of (daily) information such as news (e.g., Jones & Jones, 2019; Zarouali et al., 2020). Furthermore, conversational agents take various shapes. With increasing progress in text-to-speech and voice recognition technologies, voice-based conversational agents are becoming more and more prevalent. They are especially pushed by large companies investing in voice-based technologies such as Apple (Siri), Google (Google Assistant), Amazon (Alexa), or Microsoft (Cortana). A growing body of research has started to investigate responses to existing voice-based conversational

agents such as those incorporated in smart speakers (Cho et al., 2020; Wang et al., 2020), including the advertising context (Kim et al., 2018).

Conversational agents are implemented by an increasing number of (commercial) organizations for providing customer service, giving information about specific products, or asking consumers to write a review. One popular example in the Netherlands is “Billie”, the conversational agent of the website Bol.com (Boogert, 2019). Research in this domain has often focused on customer service agents (Følstad et al., 2018; Lou et al., 2021; van der Goot & Pilgrim, 2020). Furthermore, there is existing research on conversational agents for recommendation purposes that have investigated for example movie-related recommendations (S. Y. Lee & Choi, 2017; Sundar et al., 2016; van den Broeck et al., 2019) or recommendations of consumer goods such as cameras (Benbasat & Wang, 2005) or shoes (Chattaraman et al., 2019).

However, apart from some recent investigations on voice shopping (Rhee & Choi, 2020), literature on conversational agents in brand communication is still scarce. This is surprising, given the increasing adoption of conversational agents by brands and commercial organizations to foster new types of consumer-brand interactions. To fill this gap, this dissertation investigates responses to conversational agents in a brand communication context. It is worth stressing that the persuasive intent of a conversational agent becomes most prevalent in brand communication, in which conversational agents that provide product- or service-related recommendations specifically embed persuasive messages. Consequently, studying conversational agents in a brand communication context functions as a vantage point to study the **persuasive potential** of conversational agents in general.

## **Theoretical background: Paradigm shift from CMC to HM**

This dissertation takes the paradigmatic shift from computer-mediated communication, i.e., communicating *through* computers, towards human-machine communication, i.e., communicating *with* computers as social actors, as a theoretical starting point (Gunkel, 2012; Guzman, 2019; Peter & Kühne, 2018; Zhao, 2006). Instead of examining a computer, machine, or technology as the medium of communication, the field of human-machine communication is concerned with the “creation of meaning among humans and machines” (Guzman, 2018, p. 1).

This paradigm shift has been widely discussed in the context of social robots (Peter & Kühne, 2018; Zhao, 2006). Social robots are arguably one of the most apparent examples for technologies that are designed as an autonomous, interactive, and

human-like entity for humans to communicate and interact with. Guzman (2018) and Guzman and Lewis (2020) further discuss a human-machine communication approach for studying emerging technologies in the broader sense, such as communicative AI, virtual agents, and voice assistants – technologies that are “designed as communicative subjects, instead of mere interactive objects” (Guzman & Lewis, 2020, p. 71). Following this notion, this dissertation applies a human-machine communication perspective and understands conversational agents as more than just a communication tool. Conversational agents are imbued with human-like and conversational cues, possibly to interact in the same fashion a real human communication partner would do. They therefore function as a **communication entity**.

One important paradigm in human-machine communication is related to the idea of Computers Are Social Actors (CASA, Reeves & Nass, 1996). Scholars following this paradigm study the social responses towards machines (i.e., computers, or technological artifacts) and have made a valuable contribution to the field of human-machine communication. Numerous studies have demonstrated that humans show the same social responses – such as politeness, the revelation of personality traits, or social attractiveness – to a computer or technology as they would towards another human being (E.-J. Lee, 2010; Mou & Xu, 2017; Nass et al., 1995; Nass & Moon, 2000; Reeves & Nass, 1996).

Conversational agent research has often focused on specific design elements that potentially make a conversational agent more human-like, such as visual, identity, or conversational cues (for an overview see Feine et al., 2019; Go & Sundar, 2019). Social or human-like cues have been shown to positively influence user perceptions such as perceived anthropomorphism, and social presence (Araujo, 2018; Go & Sundar, 2019), and responses to conversational agents, such as trust (Bickmore & Picard, 2005; de Visser et al., 2016), or user satisfaction (S. Y. Lee & Choi, 2017; Verhagen et al., 2014).

These lines of research provide evidence that humans perceive a conversational agent as a communication entity and thus support the notion of communication *with* technology. While they have mostly focused on social responses to conversational agents, this dissertation extends the human-machine communication approach to specific persuasive outcomes following interactions with conversational agents. It examines how users feel about (affective), think about (cognitive), or act upon (behavioral) the conversational agent, the (commercial) message provided and the brand responsible for implementing the conversational agent. It furthermore includes several social responses explored in previous studies to understand whether they function as mechanisms possibly explaining persuasive effects.

## **A holistic approach to understand conversational agent persuasion**

Conversational agents have been compared to humans to assess whether users fail to recognize the existence of technology (Shah et al., 2016) or to understand user preferences for (non)-human communication partners (Mou & Xu, 2017). Alternatively, one or multiple specific cues within one type of conversational agent have been manipulated (e.g., Araujo, 2018; Go & Sundar, 2019; Verhagen et al., 2014) to study whether these cues influence perceptions of conversational agents. However, conversational agents, especially when used by commercial organizations to communicate with consumers, are implemented as an addition to or as a replacement of other types of online media, such as websites. Only very little research has studied conversational agents in addition to websites (Sundar et al., 2016) or different agent forms such as voice- and text-based agents (Cho et al., 2019).

From a human-machine communication perspective these comparisons are crucial, as conversational agents might lead to different responses merely by being a communication entity instead of a medium. Regarding persuasion, it is unknown whether a conversational agent is more (or less) persuasive than other types of online media previously used to communicate branded content, such as (interactive) websites, or whether different agent forms (e.g., voice- versus text-based agents) lead to different persuasive outcomes.

Therefore, this dissertation applies a holistic approach. It not only follows previous literature in comparing conversational agents imbuing different levels of human-like cues, but also presents two studies in which a conversational agent is compared to interactive websites. Furthermore, one study presented in this dissertation examines differences between different forms of conversational agents, i.e., voice- versus text-based agents.

## **Three research aims and three research questions**

This dissertation investigates the persuasive consequences of interactions with conversational agents in a brand communication context and addresses three distinct aims and research questions. Firstly, it aims to understand the extent to which a **conversational agent as a communication entity** (when compared to interactive websites, or when comparing different agent forms) influence affective, cognitive, and behavioral **persuasive outcomes**. Secondly, it aims to explore two sets of **underlying mechanisms** that can possibly explain these persuasive outcomes: responses towards

the conversational agent as an entity (i.e., perceived human-likeness, privacy concerns, intrusiveness, trust), and responses to the interaction (i.e., enjoyment, perceived interactivity, cognitive processing). Lastly, this dissertation aims to understand the over-time effects of interactions with conversational agents. It investigates **the short- and the long-term effects** of interacting with conversational agents. Figure 1 gives a conceptual overview of this dissertation and how it focuses on conversational agents as a communication entity, their influence on persuasion outcomes, the underlying mechanisms playing a role in this relationship, and the short- and long-term effects. In the following, the three aims are introduced in more detail and three main research questions are posed to examine the relations as proposed in Figure 1.

### Understanding conversational agents as a communication entity and persuasive outcomes

The first aim of this dissertation is to examine the relationship of conversational agents as communication entities and persuasion. In particular, it aims to gain knowledge on the extent to which conversational agents as communication entities – by comparing them to interactive websites; or by comparing different agent forms – influence persuasive outcomes. Following classical persuasion theories (McGuire, 1989; Perloff, 2021), this dissertation defines persuasion as the formation or change of attitudes, cognitions, and behaviors.

Figure 1. Conceptual overview of this dissertation

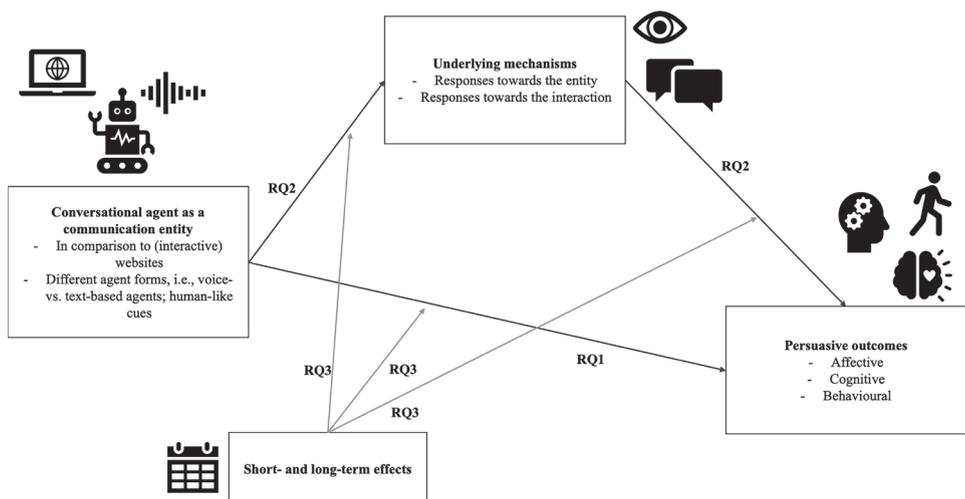


Table 1 gives an overview of the persuasive outcomes included in this dissertation. The columns of the table indicate the type of effect. Similar to the framework proposed by Vakratsas and Ambler (1999), this dissertation distinguishes **cognitive** ('what users think'), **affective** ('what users feel') and **behavioral** ('what users do') components of persuasion, and furthermore studies the effects on these outcomes in parallel, thus refraining from proposing a strict temporal sequence. While focusing on a brand communication context, this dissertation distinguishes three response objects as presented in the rows in Table 1. Previous research has shown that characteristics of the communicator as well as characteristics of the message can influence the effectiveness of persuasion (Eisend & Tarrahi, 2016). Hence, this dissertation investigates persuasive outcomes that can be related to the **message** itself (e.g., the recommendation provided), or related to the **communicator** of the message. The communicator in this case is the communication entity distributing the message (i.e., the conversational agent, or a website as a baseline). Moreover, persuasion can be related to the **brand** responsible for the message.

In sum, this leads to the following persuasion outcomes studied in this dissertation: Affective persuasive outcomes studied in this dissertation are attitudes towards the communicator (conversational agent, website as baseline), attitudes towards the message (recommendation or advice given by the agent), and attitudes towards the brand. Cognitive persuasive outcomes in this dissertation are persuasion knowledge, i.e., understanding that the communicator has the intent to persuade, and brand memory as a brand-related outcome. Behavioral outcomes can be related to the message, i.e., recommendation adherence, or to the brand, i.e., purchase intentions. Furthermore, information disclosure is included as a behavioral outcome variable. Especially considering that conversational agents possess the ability to collect personal information about their users, it is important to study whether users are more likely to reveal personal information about themselves to a conversational agent compared to other online media. Following from this, the first research question is:

**Table 1.** Overview of persuasive outcomes examined in this dissertation

	Message	Communicator	Brand
Affective	Attitudes towards the recommendation	Attitudes towards the communicator	Attitudes towards the brand
Cognitive		Persuasion knowledge	Brand memory
Behavioral	Recommendation adherence	Information disclosure	Purchase intentions

RQ1. To what extent do conversational agents as a communication entity – when compared to interactive websites, or when comparing different agent forms, i.e., different levels of human-like cues, voice- versus text-based agents – influence affective, cognitive, and behavioural persuasive outcomes?

### **Understanding the underlying mechanisms explaining the influence of conversational agents on persuasive outcomes**

Secondly, this dissertation aims to investigate the underlying mechanisms explaining persuasive outcomes following from interactions with conversational agents. Persuasive outcomes depend on a number of mechanisms, including those associated with the communicating entity, and with the interaction. Following Sundar's (2020) proposed framework for studying the effects of Human-AI interactions (HAI), effects of AI-embedded technology such as conversational agents can be both, perceptual and experiential. Therefore, this dissertation distinguishes two sets of mechanisms: Perceptions of the entity (i.e., human-likeness, privacy concerns, intrusiveness, trust), and responses to the interaction (i.e., enjoyment, perceived interactivity, cognitive processing). An overview of the underlying mechanisms examined in this dissertation is given in Table 2.

**Perceptions of the entity.** Perceptual effects are based on perceptions of AI technology as the communicator, in this case the conversational agent as the communication entity. This is closely related to the idea of source orientation, i.e., who users think they communicate with (Guzman, 2019). Following previous conversational agent research (Araujo, 2018; Go & Sundar, 2019), the first mechanism explored is perceived **human-likeness**. Human-likeness is understood as attributing humanness or human characteristics to a communication partner, i.e., the conversational agent (i.e., anthropomorphism, Epley et al., 2007) and as perceiving an agent as a social interaction partner (i.e., social presence, K. M. Lee, 2004).

While perceived human-likeness is proposed to enhance persuasiveness, this dissertation also examines two mechanisms that might diminish persuasiveness, i.e., perceiving an agent as **invading a user's privacy**, or perceiving an agent as **intrusive**. Previous research has shown that users have a concern for privacy and security when it comes to interactions with conversational agents (Følstad et al., 2018). Contrastingly, a conversational agent due to its still non-human nature might be perceived as objective or unbiased, hence possibly less intrusive or privacy invading (Lucas et al., 2014; Sundar & Kim, 2019). Relatedly, this dissertation includes **trust** as a perception of an entity that can possibly explain persuasive outcomes. It conceptualizes trust as beliefs about an agent's competence, benevolence, and integrity (Benbasat & Wang, 2005), which are directly related to the conversational agent as a communicator.

Table 2. Overview of underlying mechanisms examined in this dissertation

Perceptions of the entity	Responses to the interaction
Human-likeness	Enjoyment
Privacy Concerns	Perceived interactivity
Intrusiveness	Cognitive processing
Trust	

**Responses to the interaction.** The second set of underlying mechanisms is related to responses to the interaction and assesses the experiential effects proposed in the HAll framework (Sundar, 2020). This set of mechanisms include three responses to the interaction that have been shown to be important for emerging technologies. The first mechanism is **enjoyment** of the interaction, i.e., experiencing an interaction with a conversational agent as enjoyable in its own right (Carrol & Thoma, 1988), which has been shown to be an important factor for user satisfaction with conversational agents (S. Y. Lee & Choi, 2017). Secondly, following a large body of literature on interactivity (e.g., Voorveld et al., 2011), this set of mechanisms includes **perceived interactivity**. It is proposed that the conversational character of an agent can enhance the experience of interactivity (Sundar et al., 2016). Lastly, this dissertation examines **cognitive processing** as a response to the interaction. Based on cognitive load theory (Leahy & Sweller, 2011), it could be argued that (certain forms of) conversational agents can be more cognitively demanding to interact with. In sum, this leads to the second research question:

RQ2. To what extent do perceptions of a conversational agent as an entity and responses to the interaction explain the effects of conversational agents on persuasive outcomes?

**Understanding the short- and the long-term effects of conversational agents on persuasive outcomes**

Thirdly, this dissertation aims to shed light on the short- and long-term dynamics of conversational agent persuasion. Until now, conversational agent research has mostly explored conversational agents from a short-term perspective. For most persuasive outcomes this is a suitable approach, since these are directly related to a specific interaction and thus assessable in the short-term, e.g., whether users intend to follow a specific recommendation made in an interaction. In addition, many

underlying mechanisms are expected to operate already in the first interaction with a conversational agent, for example perceptions of human-likeness of an agent, or enjoyment of a particular interaction.

However, other mechanisms might develop over time and hence, are important to study from a long-term perspective. One particular example can be the concept of trust that has been shown to be related to relationship building over time (Hoff & Bashir, 2015). This dissertation argues, that, by interacting repeatedly with a conversational agent, users become increasingly familiar with the agent and its functionality over time, but also, that the conversational agent has the potential to learn about their users and provide personalized recommendations. Therefore, users might be especially susceptible to the persuasive messages coming from a conversational agent when the interactions go beyond short-term interactions. With the increasing integration of conversational agents in our everyday lives, it is crucial to also examine conversational agent interactions from a longitudinal perspective, meaning to study the persuasive effects of *multiple* sequential interactions with a conversational agent. To explore both, short- and long-term effects of conversational agents and to enrich the current knowledge on relationship formation with technologies, the final research question is:

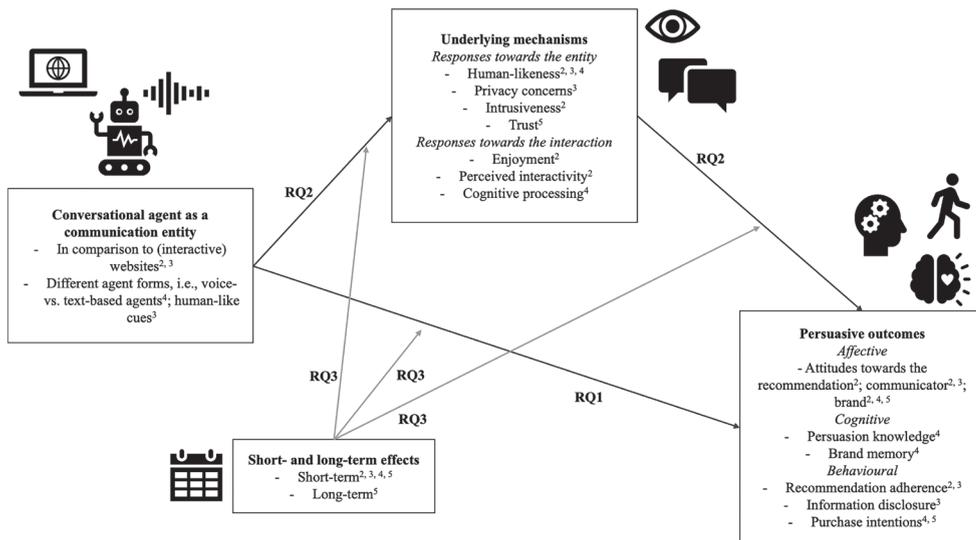
RQ3. What are the short- and long-term effects of conversational agents on persuasive outcomes?

## Dissertation outline

The research questions of this dissertation will be addressed by four experimental studies with unique datasets. Each study is covered in a separate chapter (Chapter 2, 3, 4, and 5) and is published or has been submitted for publication in peer-reviewed journals in the field. Therefore, all chapters are self-contained with their own abstract, theoretical background, methods, results, and conclusions and can be read individually. The extended conceptual overview including all variables examined in this dissertation can be found in Figure 2 and shows how the chapters relate to each other.

Chapter 2 and chapter 3 compare a conversational agent to an interactive website and focus on a service-recommendation, i.e., a recommendation for a (fictitious) health insurance. **Chapter 2** presents an online experiment (n = 242). It addresses RQ1 by studying the extent to which conversational agents, compared to interactive websites, influence users' affective (i.e., attitudes toward recommendation, communicator, and brand), and behavioral (i.e., recommendation adherence) persuasive outcomes. It furthermore addresses RQ2 by exploring several underlying mechanisms (i.e., human-likeness, intrusiveness, enjoyment, perceived interactivity) possibly explaining this

Figure 2. Extended conceptual overview of this dissertation including all variables



Note.<sup>1</sup>Chapter 1, <sup>2</sup>Chapter 2, <sup>3</sup>Chapter 3, <sup>4</sup>Chapter 4, <sup>5</sup>Chapter 5

effect. It also investigates the interplay of different, perhaps even conflicting, sources in a digital recommendation setting (i.e., source, and origin of recommendation).

**Chapter 3** presents an online experiment (n = 231) that compares conversational agents that differ in human-like cues with an interactive website. This chapter addresses RQ1 and RQ2 by exploring to what extent human-like characteristics of a conversational agent influence perceived human-likeness and privacy concerns as underlying mechanisms, and consequently, attitudes towards the communicator as an affective, and information disclosure and recommendation adherence as two behavioural persuasive outcomes.

Chapter 4 and 5 focus on branded food product-recommendations including several existing brands. **Chapter 4** compares different conversational agent forms by looking into voice- in comparison to text-based agents. In a pre-registered online-experiment (n = 450), it investigates whether using voice instead of text makes a conversational agent more persuasive (RQ1). It explores perceived human-likeness and cognitive load as underlying mechanisms that can explain why voice- and text-based agents differ in their persuasive potential by suppressing the activation of users' persuasion knowledge (RQ2). Persuasive outcome variables are cognitive (i.e., brand memory),

affective (i.e., attitudes towards the brand), and behavioral (i.e., purchase intentions).

While Chapter 2-5 address short-term interactions with conversational agents (RQ3), the last empirical chapter (**Chapter 5**) also scrutinizes effects over time and adds the long-term perspective in order to answer RQ3. In a pre-registered fifteen-day longitudinal within-subjects design (n = 242) using one type of text-based conversational agent, it tests the reciprocal relationship of repeated interactions with a conversational agent and trust in the agent as a communication entity as mechanism explaining affective (i.e., attitudes towards the brand) and behavioral (i.e., purchase intention) brand-related persuasive outcomes (RQ2).

The final chapter (**Chapter 6**) provides a general discussion and conclusion based on the findings of the empirical chapters, and addresses the theoretical, methodological, and practical implications, along with limitations and directions for future research.

## **A note on terminology: conversational agent, chatbot, virtual assistant**

Various terms related to conversational agents are used in the literature, which merit a note on the terminology used in this dissertation: *Conversational agent* is used as an umbrella term for all technologies that use natural language to interact with its users in a conversational manner (Griol et al., 2013) and is used in this introductory chapter as well as in the concluding chapter 6. Chapter 2 and chapter 3 use the term *chatbot*, which in this case refers to software that communicates in a text-based manner. Furthermore, conversational technologies are also often positioned as *virtual assistants* because they can give (daily) assistance providing information about news, weather, and they can give information in a branded context about products, prices, opening hours and even give you recommendations on what to buy. The term *virtual assistant* is used in chapter 4 and chapter 5 to specifically refer to a conversational agent implemented to assist its users.

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