7-8-2023

Affect between Humans and Conversational Agents: A Review and Organizing Frameworks

Wei Cui
National University of Singapore, discw@nus.edu.sg

Atreyi Kankanhalli
National University of Singapore, atreyi@comp.nus.edu.sg

Affect between Humans and Conversational Agents: A Review and Organizing Frameworks

Short Paper

Wei Cui
National University of Singapore
15 Computing Drive, Singapore
cuiwei@comp.nus.edu.sg

Atreyi Kankanhalli
National University of Singapore
15 Computing Drive, Singapore
atreyi@comp.nus.edu.sg

Abstract

Conversational agents (CAs), which communicate naturally with humans, are being developed and employed for a variety of tasks. Interactions between humans and CAs induce affect, which is vital to the adoption and performance of CAs. Yet, there is a lack of cumulative understanding of existing research on affect in human-CA interaction. Motivated thus, this article presents a systematic review of empirical IS and HCI studies on such affect, its antecedents and consequences. Besides conducting descriptive analysis of the studies, we also divide them into two broad categories – emotion-related, and those related to other (more persistent) affective responses. We present organizing frameworks for both categories, which complement each other. Through the review and frameworks, we contribute towards attaining a holistic understanding of extant research on human-CA interaction, identifying gaps in prior knowledge, and outlining future research directions. Last, we describe our plan for extending this work to gain additional insights.

Keywords: Conversational Agent (CA), Human-CA Interaction, Emotion, Affective Response, CA Design, Organizing Frameworks

Introduction

Recently, ChatGPT has taken the world by storm. It is an example of an advanced form of *conversational agent (CA),* which are defined as digital artifacts that conduct dialogues with users through natural language (Diederich et al. 2022). Both text-based CAs (also called chatbots) and speech-based CAs (e.g., Siri and Alexa) are starting to play an important role in everyday life and in organizational activities. For individuals, CAs undertake a variety of tasks e.g., Siri can buy products and book appointments (Rhee and Choi 2020). For organizations, CAs can deliver value through enhancing business activities in various contexts, e.g., providing customer service (Ashktorab et al. 2019) and facilitating team collaboration (Benke et al. 2022). Compared to other information systems (IS), CAs are expected to offer a higher degree of human-like interaction and convenience (Maedche et al. 2019).

To enhance their communication with humans and improve CA performance, researchers are examining various aspects of human-CA interaction. Among them, a crucial aspect is affect. *Affect* refers to the underlying experience of emotion or feeling, and is a fundamental basis for human behavior (Barrett and Bliss-Moreau 2009). Affect serves as a guiding force in human perception and decision making (Jeon 2017). It underlies user experiences and decisions to adopt and use information systems (Hibbeln et al. 2017). Individuals could be motivated to continue using a CA if they enjoyed their interactions with it (Danckwerts et al. 2020). For example, millions of people have adopted Microsoft's chatbot Xiaoice because they felt they built emotional connection with it, as the chatbot could detect human emotions and provide adaptive responses (Spencer 2018). In contrast, negative emotions evoked by chatbots could cause users to abandon their use (Cardona et al. 2019). Thus, this study focuses on understanding affect in human-CA interactions - its antecedents and consequences, which is crucial for designing effective CAs, as it can guide designers to enhance users' experiences (Yang et al. 2019). First, understanding and managing human emotions allows CAs to accomplish tasks successfully. For instance, CAs could be designed to provide emotional support for people with special needs (Park et al. 2021). Second, computing devices that express emotions can

potentially better assist human users (Hudlicka 2003). As examples, CAs with facial expressions were found to build a better rapport and connection with users (Shi et al. 2018), and CAs expressing empathy and showing social support were able to enhance users' learning (Saerbeck et al. 2010). Thus, knowledge of affective aspects of CA-human interactions can be utilized to improve both CA performance and user well-being. However, we currently lack a cumulative understanding of research in this area, and knowledge gaps.

To date, literature reviews have examined research on human-CA interaction, but not specifically about affect, including emotion. Some reviews have summarized human-CA interaction work broadly (Diederich et al. 2022; Zierau et al. 2020), yet other reviews have focused on specific CA application contexts e.g., ter Stal et al. 2020, Weber et al. 2021, while others have reviewed research on specific CA characteristics e.g., Feine et al. 2019, Rapp et al. 2021 (see *Table 1*). While these studies have significantly added to the body of knowledge on CAs, a review focusing on the affect between human users and CAs is lacking.

Literature Review Aim	Examples	Research Gap
General review of the status of CA research	Diederich et al. (2022)	Affect is briefly mentioned as one of the interaction outcomes.
General review of CA design elements	Zierau et al. (2020)	No affective aspect is mentioned.
Review of specific CA application contexts	Healthcare (ter Stal et al. 2020); Education (Weber et al. 2021)	Affect is briefly mentioned as one of the CA design elements or interaction outcomes.
Review of specific CA characteristics	Social cues (Feine et al. 2019); Text communication (Rapp et al. 2021)	Affect is briefly mentioned as one of the CA design elements or interaction outcomes.

Table 1. Prior Literature Reviews

Considering the importance of affect in human-CA interaction, there is a need to provide a holistic synthesis of extant work on this topic. Such an overview allows researchers to gain a cumulative understanding of current knowledge in this area, and aids in their identification of research gaps. Motivated thus, it is important to summarize the empirical studies on affect in human-CA interactions in a holistic manner to inform research in this area. Hence, we focus on the following research questions: *What are the antecedents and consequences of affect in human–CA interaction cumulated from empirical research in this area? What are the knowledge gaps in this work and directions for future research in this area?*

To address the above research questions, this paper presents a systematic literature review of empirical research on affect between humans and CAs, identifying its antecedents and consequences by analyzing their findings. We contribute to the literatures on human-CA interaction and affect in IS by reviewing the prior empirical studies on this topic, organizing their findings into frameworks, identifying knowledge gaps, and outlining future research avenues.

Conceptual Background

Conversational Agents

CAs are characterized by conducting dialogues with humans via natural language, where *dialogues* refer to interleaved communications between two parties (Diederich et al. 2022). The architecture of a CA usually consists of a front-end dialogue interface and a back-end knowledge base (Matthews 2020). The dialogue interface is designed to take users' inputs and provide responses, and the knowledge base connects with natural language processing and semantic reasoning tools to interpret and respond to user inputs (Maroengsit et al. 2019). To design an effective CA and understand how it interacts with human users, researchers have classified and analyzed its design elements. A common classification by Zierau et al. (2020) organized CA design elements into five categories: verbal, visual, auditory, invisible, and interaction. The *verbal* category includes elements that are expressed through words in either written or spoken form, such as CA conversation style. The *visual* and *auditory* categories describe elements that interact via humans' sense of seeing (e.g., CA embodiment) and hearing (e.g., CA voice quality), respectively. CA design elements that cannot be perceived directly by hearing, seeing, or words, such as CA personality, are captured within the *invisible* category. The last category, *interaction,* refers to the structural representation of the interaction e.g., the communication mode being text or speech (Zierau et al. 2020). We use this classification of CA design elements as part of our organizing frameworks, as described later.

Affect Related Concepts

Affect is gaining importance as a research area, as it is a fundamental aspect of human decision-making and behavior (Hibbeln et al. 2017). Early views of affect have been predominantly categorical, representing affect as discrete basic emotions, such as anger, disgust, fear, happiness, sadness, and surprise (Ekman 1992). However, as categories of basic emotions are unable to explain different aspects of affect, researchers have further conceptualized affect in terms of other key dimensions. An established dimensional model, termed as the *circumplex model of affect*, explains that affect blends *valence* on a pleasant-unpleasant continuum, and *activation* on a activated-deactivated continuum (Russell 2003). Valence represents the positive (pleasant) or negative (unpleasant) reaction to the stimulus, while activation refers to the intensity or degree of arousal. This implies that affect can be represented as a combination of these two dimensions, along with basic emotions.

The major IS work on this topic (Yan and Zhang 2018; Zhang 2013) proposed the *affective response model* of users interacting with information systems, by expanding on the circumplex model of affect. Drawing on this model, we classify affective response to a stimulus (interaction between human and CA) into two broad, but related, categories: emotion and other affective responses. *Emotion* refers to a state induced by or attributed to a specific stimulus, which is usually episode-based and short-lived (Hibbeln et al. 2017). The second category describes more persistent affect of humans in response to one-time or repeated interactions e.g., attitude, affective evaluation, and perceived affective quality (Zhang 2013). *Attitude* reflects a *summative* evaluation of the stimulus that can help guide behavior regarding the stimulus (Van den Berg et al. 2006), while *affective evaluation* represents individuals' *affect-related* appraisal of the stimulus e.g., enjoyment and satisfaction. Last, *perceived affective quality* refers to individuals' perception of a stimulus' ability to change their affect e.g., likeability (Zhang 2013), that are properties of the CA. In our study, the focal stimulus is the interaction between the human user and the CA. We will use these two broad categories of affect to develop our organizing frameworks of affect in human-CA interactions.

Research Methodology

To identify empirical studies on human-CA affect for our literature review, we followed established procedures for such reviews (Okoli 2015). The paper search and selection process was conducted in four stages (see *Table 2* for details*)*. In the *first* stage, we formulated the search query and identified relevant outlets. The search query consisted of two parts: the first part included synonyms and related terms of CA, while the second part comprised the earlier-mentioned concepts of the affective response model and related terms of affect. For the search outlets, we focused on those from the IS and HCI fields, since these two fields mainly cover human-CA interaction studies (Zierau et al. 2020). Specifically, we searched the Basket of Eight journals for the IS field, and HCI journals that cover CA topics, i.e., *Advances in Human Computer Interaction (AHCI)*, *Computers in Human Behavior*, *International Journal of Human-Computer Interaction (IJHCI),* and *International Journal of Human-Computer Studies (IJHCS)*. We also extended our search outlets to conferences in both fields, since conference proceedings contain more recent work due to their shorter acceptance cycles. The conferences comprised *ICIS, ECIS, PACIS, AMCIS, HICSS,* and *CHI*. To collect relevant papers, we used the Web of Science, AISeL, ACM Digital Library, and the websites of the respective outlets. The next two stages consisted of screening based on the inclusion and exclusion criteria, with the *second* stage screening the abstracts and keywords of the papers, and the *third* stage screening the full texts. In the *fourth* stage, we performed a backward search of the selected papers to uncover relevant studies that did not appear in the database search. As a result, a final set of 95 papers were identified for our review. The full list of 95 papers is not included in our reference list due to page limits.

Search Query	(((Conversational OR Interactive OR Virtual OR Digital OR AI OR Artificial) AND (Agent OR Assistant)) OR Chatbot OR Bot) AND (Affect OR Emotion OR Feel OR Attitude OR Mood OR Temperament OR Sentiment)
Initial Results	351 papers (until Jan 15, 2023)
Inclusion Criteria	(1) Paper examines human-CA interaction (2) Paper assesses human users' and/or CAs' affect, and/or designs CAs' affect
Exclusion Criteria	(1) Paper is not empirical (e.g., literature review, conference track introduction)

	(2) Paper studies one-way communication between human and agent rather than two-way conversation (e.g., students watching a video of a pedagogical agent) (3) Paper adopts *Wizard-of-Oz* setting where agents are not truly automated (i.e., agents are perceived as CAs by participants, but are actually replied by researchers) (4) Paper asks users to evaluate agents by only imagining their interaction with the agents (e.g., through looking at agents' images or scenarios, not dialogues)
Results based on criteria	After abstract-keywords-scan (second stage): 198 papers After full text-search (third stage): 89 papers After backward search (fourth stage): 95 papers (final sample)

Table 2. Paper Search and Selection Process

The final sample of 95 papers was analyzed, whereby the consequences and antecedents were coded. We mainly used the classification of affect concepts in the affective response model i.e., emotion and other affective responses (attitude, affective evaluation, perceived CA affective quality) to code affect-related consequences. Further, we adopted Zierau et al.'s (2020) classification of CA design elements to code our CA-related IVs, supplemented by our own categories as needed.

Results

We present our findings in the next three sub-sections. The first section reports descriptives of the 95 papers. The second and third sections analyze the antecedents and consequences of affect in human-CA interaction research, and present our organizing frameworks. Specifically, the second section focuses on *emotions* for a human-CA interaction episode, while the third section is about *other (more persistent) affective responses* of humans to CAs. The relationship between the two frameworks is also discussed.

Descriptives

Our review shows a rise in the number of papers studying affect between humans and CAs since 2017, although the oldest paper was from 2003. There was a drop in paper count in 2022, which is likely due to the research challenges faced during the pandemic. In our review, there were 48 journal papers and 47 conference papers. Among journals, Computers in Human Behavior published the most papers on this topic (25), followed by IJHCS with 12 papers and IJHCI with 6 papers. The remaining journal papers were published in AHCI and the three IS journals, ISR, JMIS and JAIS. Among conferences, CHI published 28 papers, while the IS conferences published 20 papers in total. It is worth noting that the majority of the papers were in HCI outlets, while the IS outlets were less represented (24%), especially the IS journals.

The reviewed studies were situated in various *application contexts*. The most studied contexts were CAs for customer service and healthcare with 19 and 18 papers respectively, followed by general dialogue and social CAs (11 papers each). Other commonly studied contexts were CAs as personal assistants (9) and CAs for education (7). Further, 2 papers explored CAs in multiple contexts. In terms of *research methods*, experiments were most often used (58 papers), with 55 studies conducting lab experiments in either offline or online settings and 3 studies in field conditions. The second most common method was survey (24), followed by interviews (16), design (4), and archival data analysis (2). Among them, 11 studies performed qualitative analysis of interview data to evaluate the CAs. Overall, 10 papers used more than one research method, and the most popular mixed-method combination was interview with survey.

With respect to *theories used*, the leading category (34 papers) consisted of social reaction-related theories, including computers-are-social-actors (Nass et al. 1994), media equation (Reeves and Nass 1996), mindlessness (Langer 1992) and social response theory (Nass and Moon 2000). These theories share similar concepts and propose that people react socially to computers similar to how they interact with each other. Further, to understand humanlike attributes of CAs, anthropomorphism and uncanny valley views were employed in 9 papers. Specifically, anthropomorphism refers to the tendency to attribute human characteristics to non-human entities (Epley et al. 2007). Uncanny valley indicates that interaction with an artificial entity that seems almost human will lead to a sense of discomfort and uneasiness for users (MacDorman et al. 2009). Additionally, 9 papers used communication theories (e.g., drama triangle, communication privacy management theory) and technology adoption theories (e.g., technology acceptance model, the technology-organization-environment framework). However, affect-related theories

i.e., affective response model (Zhang 2013), affect infusion model (Forgas 1995) and emotional contagion (Hatfield et al. 1993), were adopted in relatively few (3) papers. Researchers utilized the affective response model to explain the duality between social and transactional elements of CA's responses. The affect infusion model was utilized to understand users' satisfaction with a CA for tasks that were more versus less affective. Emotional contagion helped explain how CA-expressed positive emotions influence customers perceptions of the CA. We found 8 papers utilizing multiple (2 or 3) theories, while a large proportion (44%) of the studies had no theoretical foundations.

Emotion in Human-CA Interactions

More than half of the reviewed papers (54) focused largely on emotion in human-CA interactions. We observed that emotion was studied before/during or when it was induced after the human-CA interaction, for both humans and CAs. Emotion was regarded as an antecedent, when it was assessed before/during the interaction or was designed as a CA element. In such cases, emotion's effects were examined on various outcomes. On the other hand, when emotion was induced after the human-CA interaction, it was treated as an outcome and its antecedents were explored. To synthesize their findings, we organized the concepts in the reviewed papers into two broad categories i.e., antecedents studied and outcomes studied, in our first framework (see *Figure 1*). The antecedents were further classified as human (user emotions pre- or during the interaction), CA (design elements), and other. The outcomes were categorized as human (user emotions post-interaction) or CA-emotion related outcomes, and other outcomes.

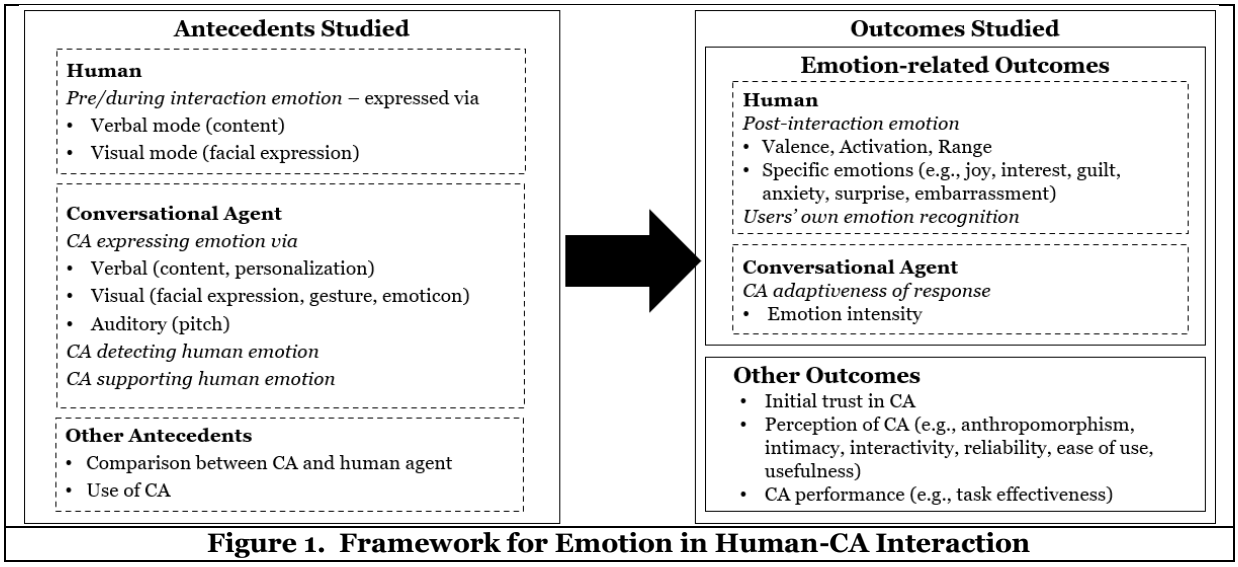

Figure 1. Framework for Emotion in Human-CA Interaction

The *CA-related antecedents* describe how CAs were designed to express emotion in dialogues. These papers studied CA emotions expressed via verbal content, visual design elements (e.g., facial expression, gesture, and cues such as emoticons) and auditory design elements (e.g., voice pitch). The objectives of these papers were to understand the effects of CA's expressing emotions on users' perceptions and behaviors, so that CAs could be better designed to assist humans. Moreover, there were studies of CA features intended to detect users' emotions or provide them emotional support. Here, too, the features were regarded as design elements of the CA, wherein their impacts on user emotions and other outcomes were explored. Regarding *human-related antecedents*, reviewed papers usually assessed the emotions that users expressed before or during their interactions with the CA. For example, users might feel embarrassed when they buy sensitive products from a pharmacy (Mozafari et al. 2021). A few papers did not indicate the specific pre- or during interaction user emotion, but mentioned that users expressed their emotions through the dialogue content (Xu et al. 2017) or facial expressions in the images input to the CA (Huber et al. 2018). Users' pre- or during interaction emotions were regarded as inputs to the dialogue that could influence CA performance. In terms of *other antecedents*, researchers compared the use of CAs vs. human agents, or just the use of CAs.

Among the outcomes, *human post-interaction emotions* were most investigated. Studies in this category examined the valence, activation, and range of emotions that users expressed after interaction with the CA

was over. Additionally, users' specific emotional responses were examined, including positive emotions such as joy, negative emotions such as anxiety and guilt, and other emotions such as surprise. These post-interaction emotions were captured by survey measures. Further, one study discussed the design of a CA that assisted users with neurodevelopmental disorders in recognizing their own emotions (Catania et al. 2019). In terms of *CA outcomes*, the related papers examined how CAs responded adaptively after detecting human emotions e.g., Huber et al. (2018) observed that the CA's responses were of better quality when it detected human emotions from users' inputs of text and images, as compared to only text. *Other outcomes* studied include users' initial trust, perceptions of CAs, and performance of CAs. The antecedents for these outcomes were usually the emotions expressed by the CAs.

Other Affective Responses in Human-CA Interactions

Other (more persistent) affective responses, including attitude, affective evaluation, and perceived affective quality, were studied in 48 papers. These three concepts were assessed as user outcomes, with the reviewed papers focusing on their antecedents and adoption-related consequences. Our framework for this form of affect was thus organized into two broad categories i.e., antecedents studied, and outcomes studied (see *Figure 2*). The antecedents were further sub-divided into three categories i.e., human, CA, and other. The outcomes were classified as other affective responses - attitude towards CA, affective evaluation of CA, and perceived CA affective quality as per Zhang (2013), adoption-related, and other outcomes.

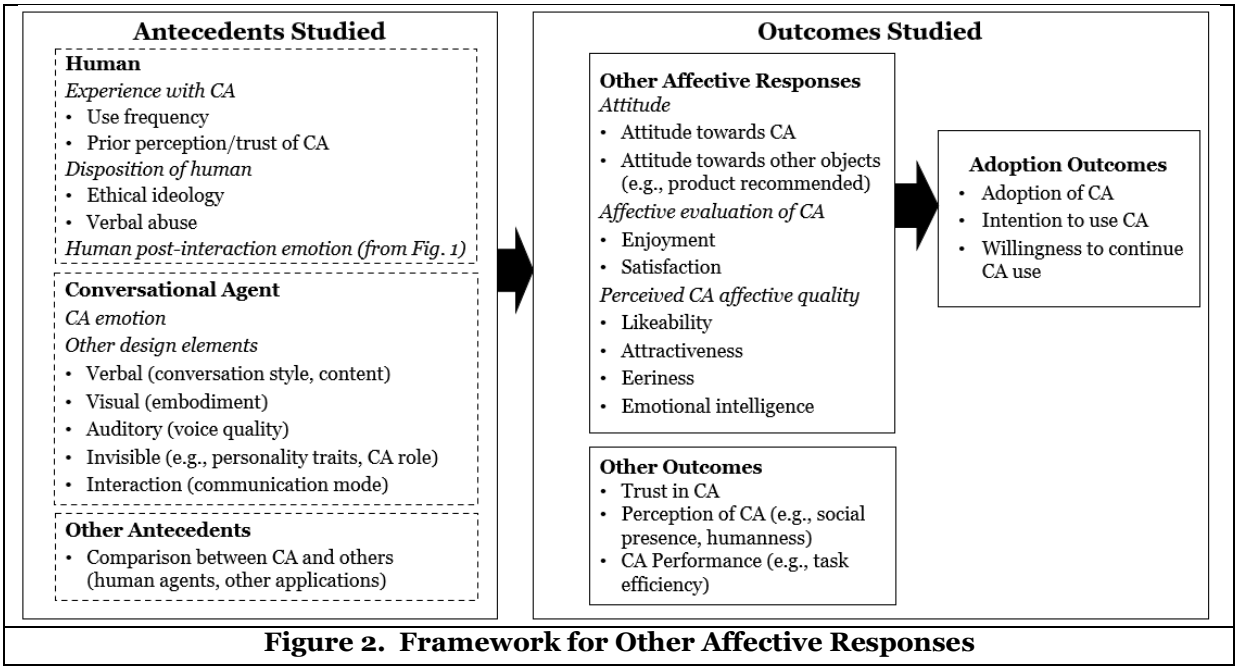

Figure 2. Framework for Other Affective Responses

The *human-related antecedents* included users' experience with CAs. Here, the frequency of using CAs, users' past perceptions towards CAs, such as perceived usefulness and trust, were assessed. A few papers studied human dispositional antecedents, e.g., the impact of users' ethical ideology, or how the CA could cope with users' verbal abuse. Interestingly, some papers investigated how the users' post-interaction emotions, which were outcomes in *Figure 1*, further influenced their other affective responses. For example, Riquel et al. (2021) found that CA's humanness increased positive valence and activation of user emotion, which in turn increased user's satisfaction towards the CA.

For *CA-related antecedents*, CA emotions were examined as antecedents of users' affective responses. Among CAs' verbal design elements, the impacts of conversation style and dialogue content were examined. Visual elements studied as antecedents included CA embodiment. Specifically, CAs can be disembodied e.g., recommending products to users via voice only (Rhee and Choi 2020), virtual static e.g., a chatbot with static human image (Brendel et al. 2020), virtual interactive e.g., a co-player with a 3D avatar (Lim and Reeves 2010), or physical e.g., a service robot (Diederich et al. 2022). The impacts of CA's auditory elements e.g., voice quality, and interaction elements e.g., communication mode were also explored. CAs could

communicate via text and speech, in addition to facial expressions, gestures and emoticons. Invisible elements whose effects were evaluated included CA's personality traits and role (e.g., assistant or friend). Moreover, some studies compared the performance of CAs with human agents or with other applications.

In terms of *outcomes*, among studies on *attitude,* a few examined both attitude towards the CA and attitude towards other objects, e.g., Rhee and Choi (2020) evaluated users' attitude towards the product recommended by the CA. With respect to CA's *affective evaluation*, the reviewed papers mainly explored users' satisfaction and enjoyment with the CA as outcomes. Regarding *perceived CA affective quality*, likeability of the CA was examined most, followed by attractiveness, eeriness, and perceived emotional intelligence of the CA. The three categories of affective responses are also interrelated. For example, emotional intelligence of the CA increased user satisfaction (Kim and Im 2023). Additionally, *other outcomes* were evaluated, such as users' trust in the CA, perceptions of the CA, and CA performance. Finally, CA adoption, intention to use, and willingness to continue use were evaluated as outcomes in 9 papers.

In general, CAs expressing emotions or adapting their responses to users' emotions were found to enhance users' attitude towards CAs (Diederich et al. 2019). We note that emotion and other affective responses are not independent of each other – these two forms of affect are related in that episode-based emotions further influence the more persistent affective responses of users, and vice versa.

Taken together, the organizing frameworks proposed in Figures 1 and 2 complement each other to provide an overview of extant research on affect in human-CA interactions. The former focuses on episode-based or short-lived emotion, while the latter focuses on more persistent affect. The two frameworks depict the antecedents and outcomes of these affect concepts, as well as the interplay between the two forms of affect.

Contributions and Future Research Directions

Understanding the nature of affect between humans and CAs is crucial to design effective CAs. For this purpose, we conducted a systematic literature review to identify and synthesize prior research on affect in human-CA interactions. Theoretically, we contribute to IS and HCI literatures by analyzing the research on this topic and proposing two frameworks to organize the studied concepts. The frameworks present the range of affect concepts examined, both as antecedents and outcomes, covering short-lived and more persistent affect. This paper also has important practical implications - practitioners can get a structured overview of existing knowledge in human-CA affect and know better about how to design CAs to improve affective outcomes. We now outline several future research avenues based on our review results.

Our findings show that more research on affect in human-CA interactions was published in HCI outlets as compared to IS venues. As CAs gain popularity, it becomes important to understand how they induce human emotions, express emotions themselves, and respond to users' emotions. Going beyond the HCI studies on this topic with a greater emphasis on design, the nature of affect between humans and CAs could benefit from more IS research attention to explicate the broader antecedents and consequences of such affect. *Second,* more theory-driven research is warranted to provide robust foundations for understanding this topic, considering that more than 44% of the reviewed studies did not employ theory. Thus, there is much scope for utilizing and extending affect-related theories and relevant IS theories, such as interpersonal conflict theory (Barki and Hartwick 2004), to gain more insights about human-CA affect. *Third,* our framework for emotion reveals that certain emotions have received less research attention which may due to application contexts with these emotions were less salient, such as human sadness. Understanding these emotions is important because it can provide guidelines for practitioners on how to design CA to enhance positive emotions and mitigate negative emotions. Also, the impacts of the full range of CA design elements on human emotions have not been explored. Thus, there is potential for future research on a wider range of emotions and CA design elements. Moreover, as prior work did not uncover specific emotions expressed in dialogues, it is important to investigate which emotions are most frequently expressed by users in real scenarios, and how CAs could detect and respond to those emotions. *Fourth,* while CAs are being designed with varied embodiments, research evaluating physical embodiments remains limited. Future research could examine how human users react to such CAs, and how different embodiments interact with communication modes to influence affect. *Fifth,* longitudinal studies are needed to evaluate more persistent affective responses and outcomes for convincing and reliable results, since extant studies mainly measured affect in one experiment. Additionally, studies on affective responses have mainly focused on humans. Future research could explore long-term CA outcomes, such as CA's adaptivity.

In conclusion, while this paper provides a timely review of the literature on affect in human-CA interactions, it has a few limitations, which we aim to address in future. Going forward, we intend to: 1) explore this topic for varied application contexts and tasks, 2) deepen the analyses of research themes based on theoretical perspectives, and 3) explore specific antecedent-outcome relationships (their magnitude, sign and nature) through meta-analysis, to develop further understanding of this topic.

Acknowledgements

This research/project is supported in part by the National Research Foundation, Singapore under its AI Singapore Program (AISG Award No: AISG2-RP-2020-016).

References

Ashktorab, Z., Jain, M., Liao, Q. V., and Weisz, J. D. 2019. Resilient chatbots: Repair strategy preferences for conversational breakdowns. *Proceedings of CHI,* Glasgow.

Barki, H., & Hartwick, J. (2004). Conceptualizing the construct of interpersonal conflict. *International Journal of Conflict Management,* 15(3), 216-244.

Barrett, L. F., & Bliss-Moreau, E. (2009). Affect as a psychological primitive. *Advances in Experimental Social Psychology*, 41, 167-218.

Benke, I., Gnewuch, U., & Maedche, A. (2022). Understanding the impact of control levels over emotion-aware chatbots. *Computers in Human Behavior*, 129, 107-122.

Brendel, A.B., Greve, M., Diederich, S., Buhrke, J., & Kolbe, L.M. (2020). You are an idiot!-How conversational agent communication patterns influence frustration and harassment. *AMCIS*, virtual.

Cardona, D. R., Werth, O., Schonborn, S., & Breitner, M. H. (2019). A mixed methods analysis of the adoption and diffusion of chatbot technology in the german insurance sector. *Proc. AMCIS*, Cancun.

Catania, F., Di Nardo, N., Garzotto, F., & Occhiuto, D. (2019). Emoty: An emotionally sensitive conversational agent for people with neurodevelopmental disorders. *Proc. 52nd HICSS.*

Danckwerts, S., Meißner, L., & Krampe, C. (2020). Hi, can you recommend a movie? Investigating recommendation chatbots in media streaming services. *Proceedings of ECIS.*

Diederich, S., Brendel, A. B., Morana, S., & Kolbe, L. (2022). On the design of and interaction with conversational agents: An organizing and assessing review of human-computer interaction research. *Journal of the Association for Information Systems,* 23(1), 96-138.

Diederich, S., Janssen-Müller, M., Brendel, A. B., & Morana, S. (2019). Emulating empathetic behavior in online service encounters with sentiment-adaptive responses: Insights from an experiment with a conversational agent. *Proceedings of ICIS,* Munich.

Ekman, P. (1992). An argument for basic emotions. *Cognition & Emotion,* 6(3-4), 169-200.

Epley, N., Waytz, A., & Cacioppo, J. T. (2007). On seeing human: A three-factor theory of anthropomorphism. *Psychological Review*, 114(4), 864-86.

Feine, J., Gnewuch, U., Morana, S., and Maedche, A. (2019). A taxonomy of social cues for conversational agents. *International Journal of Human-Computer Studies* (132), 138–161.

Forgas, J.P. (1995). Mood and judgment: The affect infusion model. *Psychological Bulletin,* 117(1), 39.

Hatfield, E., Cacioppo, J. T., & Rapson, R. L. (1993). Emotional contagion. *Current Directions in Psychological Science*, 2(3), 96-100.

Hibbeln, M., Jenkins,J.L., Schneider,C., Valacich,J.S., and Weinmann, M. 2017. How is your user feeling? Inferring emotion through human–computer interaction devices. *MIS Quarterly* (41:1), pp. 1-22.

Huber, B., McDuff, D., Brockett, C., Galley, M., & Dolan, B. (2018). Emotional dialogue generation using image-grounded language models. *Proceedings of CHI.*

Hudlicka, E. (2003). To feel or not to feel: The role of affect in human–computer interaction. *International Journal of Human-Computer Studies,* 59(1-2), 1-32.

Jeon, M. (2017). Emotions and affect in human factors and human–computer interaction: Taxonomy, theories, approaches, and methods. in *Emotions and Affect in Human Factors and Human-Computer Interaction*. Elsevier, 3-26.

Kim, J., & Im, I. (2023). Anthropomorphic response: Understanding interactions between humans and artificial intelligence agents. *Computers in Human Behavior*, 139, 107512.

Langer, E.J. (1992). Matters of mind: Mindfulness/mindlessness in perspective. *Consciousness and Cognition*, 1(3), 289-305.

Lim, S., & Reeves, B. (2010). Computer agents versus avatars: Responses to interactive game characters controlled by a computer or other player. *International Journal of Human-Computer Studies,* 68(1-2).
MacDorman, K. F., Green, R. D., Ho, C.-C., & Koch, C. T. (2009). Too real for comfort? Uncanny responses to computer generated faces. *Computers in Human Behavior,* 25(3), 695-710.
Maedche, A., Legner, C., Benlian, A., Berger, B., Gimpel, H., Hess, T., Hinz, O., Morana, S., & Söllner, M. (2019). AI-based digital assistants. *Business & Information Systems Engineering,* 61(4), 535-544.
Maroengsit, W., Piyakulpinyo, T., Phonyiam, K., Pongnumkul, S., Chaovalit, P., & Theeramunkong, T. (2019). A survey on evaluation methods for chatbots. *Proceedings of ICIET*.
Matthews, P. (2020). Knowledge organisation systems for chatbots and conversational agents: A review of approaches and an evaluation of relative value-added for the user. *Knowledge Organization at the Interface*: Ergon-Verlag, 274-283.
Mozafari, N., Hammerschmidt, M., & Weiger, W. (2021). That's so embarrassing! When not to design for social presence in human-chatbot interactions. *Proceedings of ICIS, Austin*.
Nass, C., & Moon, Y. (2000). Machines and mindlessness: Social responses to computers. *Journal of Social Issues,* 56(1), 81-103.
Nass, C., Steuer, J., & Tauber, E. R. (1994). Computers are social actors. *Proceedings of CHI*.
Okoli, C. (2015). A guide to conducting a standalone systematic literature review. *Communications of the Association for Information Systems*, 37, 43–52.
Park, H., & Lee, J. (2021). Designing a conversational agent for sexual assault survivors: Defining burden of self-disclosure and envisioning survivor-centered solutions. *Proceedings of CHI*.
Rapp, A., Curti, L., & Boldi, A. (2021). The human side of human-chatbot interaction: A systematic literature review of ten years of research on text-based chatbots. *International Journal of Human-Computer Studies*, 151, 102630.
Reeves, B., & Nass, C. (1996). *The media equation: How people treat computers, television, and new media like real people.* Cambridge, UK.
Rhee, C. E., & Choi, J. (2020). Effects of personalization and social role in voice shopping: An experimental study on product recommendation by a conversational voice agent. *Computers in Human Behavior,* 109, 106359.
Riquel, J., Brendel, A. B., Hildebrandt, F., Greve, M., & Kolbe, L. M. (2021). Even the wisest machine makes errors–An experimental investigation of human-like designed and flawed conversational agents. *Proceedings of ICIS, Austin*.
Russell, J. A. (2003). Core affect and the psychological construction of emotion. *Psychological Review*, 110(1), 145.
Saerbeck, M., Schut, T., Bartneck, C., & Janse, M. D. (2010). Expressive robots in education. *Proc. of CHI*.
Shi, Y., Yan, X., Ma, X., Lou, Y., and Cao, N. 2018. Designing emotional expressions of conversational states for voice assistants: Modality and engagement. *Proceedings of CHI*.
Spencer, G. 2018. Much more than a chatbot: China's Xiaoice mixes AI with emotions and wins over millions of fans. from https://news.microsoft.com/apac/features/much-more-than-a-chatbot-chinas-xiaoice-mixes-ai-with-emotions-and-wins-over-millions-of-fans/.
ter Stal, S., Kramer, L. L., Tabak, M., op den Akker, H., & Hermens, H. (2020). Design features of embodied conversational agents in ehealth: A literature review. *International Journal of Human-Computer Studies*, 138, 102409.
Van den Berg, H., Manstead, A. S., van der Pligt, J., & Wigboldus, D.H. (2006). The impact of affective and cognitive focus on attitude formation. *Journal of Experimental Social Psychology,* 42(3), 373-379.
Weber, F., Wambsganss, T., Rüttimann, D., & Söllner, M. (2021). Pedagogical agents for interactive learning: A taxonomy of conversational agents in education. *Proceedings* of *ICIS, Austin*.
Xu, A., Liu, Z., Guo, Y., Sinha, V., & Akkiraju, R. (2017). A new chatbot for customer service on social media. *Proceedings of CHI*.
Yan, J. L. S., and Zhang, P. 2018. Affect in the ICT context. in *The Routledge Companion to Management Information Systems*. Routledge, pp. 166-182.
Yang, X., Aurisicchio, M., & Baxter, W. (2019). Understanding affective experiences with conversational agents. Proceedings of *CHI*.
Zhang, P. (2013). The affective response model: A theoretical framework of affective concepts and their relationships in the ICT context. *MIS Quarterly,* 37(1), 247-274.
Zierau, N., Elshan, E., Visini, C., & Janson, A. (2020). A review of the empirical literature on conversational agents and future research directions. *Proceedings of ICIS, virtual*.