User Preferences for Interaction Modalities: The Influence of Task, Context, and User Characteristics when Interacting with Conversational Agents

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Abstract

When using conversational agents (CAs), the interaction is typically either text- or speech-based. Existing research focuses on the effects of these interaction modalities or the general adoption of either text- or speech-based interaction, leaving an important research gap regarding users' underlying preferences for interaction modalities. Therefore, this study investigates the influence of task, context, and individual user characteristics on user preferences for interaction modalities. We use a two-step approach consisting of exploratory interviews to identify 14 influencing factors, followed by a scenario-based experiment to quantitatively assess the impact of the identified task, context, and user characteristics. The results provide insights into the drivers for users' preferences for interaction modalities when interacting with CAs. Thereby, we contribute to a more holistic understanding of human-CA interaction and provide a starting point for future research. The findings can further guide practitioners regarding which factors to consider in their decisions when investing in CAs.

Keywords: Conversational agents, interaction modality, user study, user preferences, human-computer-interaction

1. Introduction

Users are becoming increasingly accustomed to interacting with conversational agents (CAs) at work and in their personal lives (Moriuchi, 2023). Likewise, firms across domains are deploying CAs to support their employees or to provide a natural and intuitive interface for customer interactions (McTear et al., 2016). For example, banks offer robo-advisors to help users select financial products according to their (risk) preferences (Tauchert & Mesbah, 2019). Healthcare providers implement CAs to assist physicians with anamnesis (Müller et al., 2019). Retailers use customer service CAs to respond to customer requests around the clock (Gnewuch et al., 2017).

Typically, these user-CA interactions are either text-based, as in the case of chatbots, or speech-based, as in interactions with voice assistants. Neither modality is inherently better, but each design option has different implications for user interaction (Rzepka et al., 2022). While, for example, speech-based interaction offers increased convenience by freeing up hands (Luger & Sellen, 2016), text-based interaction allows for the conversation to be re-read (Schmitt et al., 2021). Ultimately, it depends on the individual user which interaction modality they prefer. However, firms often do not have the resources to implement CAs with both interaction modalities, i.e., for a specific use case they have to decide whether to invest in a chatbot or a voice assistant. Their consideration is further complicated by the fact that it is not only the technical CA design option (i.e., the interaction modality) that influences the user interaction, but also other factors such as the task, the context, or the users themselves (Rzepka & Berger, 2018).

In existing research, there is no holistic view of the user-CA interaction. While a range of studies explores the effect of text- or speech-based interaction on the evaluation and outcome of the user interaction (e.g., Melumad, 2023; Schwede et al., 2022; Zierau et al., 2022); only a small fraction considers both interaction modalities (Diederich et al., 2022). More importantly, research on factors that influence users' preference for one or the other interaction modality is scarce. It is still relatively unexplored, how the task, the context, and the users themselves influence whether text- or speech-based interaction is preferred. Hence, we pose the following research question:

How do task, context, and individual characteristics influence user preferences for interaction modalities when interacting with CAs?

To address this research question, we combine an exploratory qualitative approach with a quantitative approach. First, we conduct interviews with CA users to identify factors that influence their preferences for CA interaction modalities. Based on the interview results, we conduct a scenario-based experiment to

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quantitatively assess the impact of the identified influencing factors(Finch, 1987). In doing so, we provide empirical evidence for four task characteristics, four context characteristics, and six user characteristics that emerge as influencing factors for users' preference for text- or speech-based interaction with CAs. Thereby, our study contributes to a more holistic understanding of human-CA interaction and offers a starting point for future research on user-centered CA design. Our findings further guide practitioners in making decisions about investing in CAs by providing an overview of factors to consider and insights into which interaction modality is preferred for which task, context, and type of user.

This paper is structured as follows: In Section 2, we present the conceptual background of our study and provide an overview of existing research. Section 3 outlines the research design, which consists of semi-structured interviews and a scenario-based experiment. The analysis results of both the qualitative and quantitative study part are reported in Section 4. Finally, Section 5 discusses the findings, indicates the implications, and concludes the paper.

2. Foundations and related work

CAs represent artificial intelligence (AI)-based systems that interact with users in natural language, providing a natural and intuitive user interface (Diederich et al., 2022). According to their primary interaction mode, they are distinguished into text-based CAs, called chatbots, and speech-based CAs, mostly referred to as voice assistants (McTear et al., 2016). So far, existing research focuses on the *effects* of these different interaction modalities, e.g., on users' mental workload during task completion (Le Bigot et al., 2007) or the interaction experience (Zierau et al., 2022). Similarly, researchers explore the best fit of task characteristics and interaction modality to enhance users' performance (Lee et al., 2001; Rzepka et al., 2022). Another stream of research explores users' *general decision to use text- or speech-based CAs*, focusing on one of the two interaction modalities (see Table 1). For example, while Luger and Sellen (2016) examine factors influencing users' decision to use voice assistants, Wolff et al. (2021) explore the use of chatbots at the workplace and identify eleven influencing factors. Similar studies were conducted by other researchers (Brandtzaeg & Følstad, 2017; Laumer et al., 2019; Riefle & Benz, 2021; Rzepka et al., 2020). However, there is a scarcity of studies that explore the *factors that influence users' preferences for interaction modalities* (Diederich et al., 2022). We only found one related study that is not CA-specific but looks at interpersonal communication tools: Köster (2016) explores users' reasons for using different features of personal communication tools such as calling via phone or sending text messages, finding that different features link to different utilitarian, hedonic, emotional values (e.g., convenience, perceived control). Yet, there is no comparable research on CAs, so a holistic view of the factors that influence users' preferences for interaction modalities when interacting with text- or speech-based CAs is lacking.

To gain a more comprehensive perspective, we draw on Rzepka and Berger's (2018) framework of human-AI interaction (Figure 1), which highlights task, context, and individual user characteristics (in addition to the system itself) as the key influencing factors on user interaction with AI-based systems.

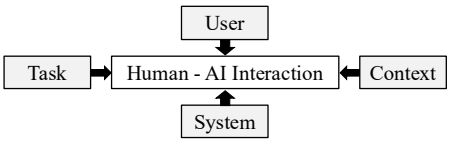

Figure 1. Framework of Human-AI interaction (adapted from Rzepka & Berger (2018))

Tasks are defined as self-contained pieces of work with a specific aim, often to be finished within a certain time (Byström & Järvelin, 1995); whereas context refers to the environmental, organizational, cultural, or social setting in which someone or something exists (Merriam-Webster, 2023). User characteristics are defined as users' dispositions and personality traits (Al-Natour & Benbasat, 2009; Zhang et al., 2009), that determine the way they perceive, feel, and think (Kozhevnikov, 2007). Because of their fundamental and consistent nature, user characteristics can be conceptualized as stable over time and across task contexts (Kozhevnikov, 2007; Thatcher & Perrewé, 2002). By shaping users' cognition and emotion, user characteristics are an important determinant of individuals' attitudes and behaviors towards information systems (Thatcher & Perrewé, 2002). This study examines all of the above factors and evaluates how they influence user preferences for interaction modalities.

Author(s)	Research focus	Method	Key finding(s)
Research on the general decision to use text- or speech-based conversational agents			
(Wolff et al., 2021)	Factors influencing the adoption of text-based CAs at the workplace	Interview study	Eleven factors, categorized into technological (e.g., functional scope), organizational (e.g., maintenance effort), environmental (e.g., data protection), and individual factors (e.g., expectations regarding capabilities), are identified.
(Riefle & Benz, 2021)	Factors that influence the adoption of CAs, with a focus on user-specific factors	Literature review, interview study	15 general influencing factors (e.g., perceived usefulness, perceived risk, trust) are identified in existing research and are complemented by five user-specific factors (e.g., personality, cognitive style) that provide potential for future research, identified in the interviews
(Rzepka et al., 2020)	Users' decision to use a voice assistant for shopping	Interview study	Perceived benefits (e.g., efficiency, convenience), and costs (e.g., limited control, lack of trust) influence users' decision to use or not use a voice assistant to purchase a product.
(Laumer et al., 2019)	Use cases for conversational agents from users' perspective	Interview study	32 use cases for CAs (e.g., information search, smart home control, customer support, entertainment), clustered into seven categories, are identified.
(Brandtzaeg & Følstad, 2017)	Factors influencing the adoption of text-based CAs	Online survey	Key motivational factors for interacting with a chatbot are identified and clustered into five categories (e.g., productivity, entertainment, curiosity).
(Luger & Sellen, 2016)	Factors influencing the general adoption of speech-based CAs in everyday situations	Interview study	Factors such as the effort to learn how to use the CA, the offered convenience, or the limited transparency influence individuals' use of voice assistants.
Research on the factors that influence the preferences for interaction modalities			
(Köster, 2016)	*(Not CA-specific, related to interpersonal communication)* Users' reasons for using different personal communication tool features	Interview study	Several linkages between the personal communication tool (e.g., instant messaging, calling via phone) features and the personal values that users try to derive while using the tools are uncovered; e.g., users seek to obtain utilitarian, hedonic, or emotional values when choosing between personal communication tool features. For example, voice messaging or calls are used for convenience reasons while text messages are used due to the perceived control.
This study	Task, context, and individual characteristics influencing user preferences for interaction modalities	Interviews, scenario-based experiment	Four task characteristics, four context characteristics, and six user characteristics are identified as influencing factors of user preferences for interaction modalities. Further, their impact is quantitatively assessed.

Table 1. Overview of existing literature

3. Research design

To investigate how task, context, and user characteristics influence users' preferences for interaction modalities when interacting with CAs, we follow a two-step approach. First, we conduct exploratory interviews with CA users to identify concrete influencing factors. Second, we conduct a scenario-based experiment to quantitatively evaluate the impact of the identified influencing factors (Finch, 1987).

In **step 1**, nine *semi-structured interviews* with a total duration of 371 minutes are conducted with CA users (3 female, 23-38 years) who have experience with both text- and speech-based interaction. An interview guideline is developed based on the guidelines by Gläser and Laudel (2010) with the aim of broadly exploring the influencing factors on users' preferences for text- or speech-based interaction when interacting with CAs.

After transcribing, the interviews are analyzed using open and axial coding according to the recommendations by Saldaña (2013). This qualitative analysis reveals four task characteristics, four context characteristics, and six user characteristics as influencing factors of user preferences for interaction modalities.

Building on the interview findings, in **step 2**, we conduct a *scenario-based experiment* (n=132) to quantitatively assess the impact of the task, context, and user characteristics. The use of a scenario-based technique is a common approach to control for confounding influences while allowing for experimental realism, thereby enhancing both internal and external validity (Finch, 1987; Mozafari et al., 2020; Xu et al., 2014). In the study (implemented with SoSci Survey), participants are presented with eight randomly ordered scenario pairs – reflecting each of the identified task and context characteristics. For example, a pair consists of a scenario describing a high-complexity task and a scenario describing a low-complexity task; or a scenario describing a public context and a scenario describing a private context. Participants are then asked to select whether they prefer to interact with a chatbot or voice assistant in the described situation. For example, the scenario for an explorative task reads "*You are looking for nice restaurants in your town. You have no specific preferences on what or where to eat. You just want to explore your options.*", for which participants need to decide whether they prefer text- or speech-based interaction with a CA. In addition, we include manipulation checks to verify that the scenarios reflect the intended task and context characteristics. Next, participants answer a set of questions measuring their user characteristics, i.e., specifically the six characteristics identified in the interviews. We adapt established measures from existing research to ensure validity (find the sources in Section 4). The seven-point Likert scales anchored from 'strongly disagree' to 'strongly agree'. Finally, participants' demographics are collected.

After a successful pretest of the experiment, 186 participants are recruited via online research platforms (i.e., Survey Circle, Survey Swap) and social media (i.e., LinkedIn, Facebook) targeting CA users. During the data preparation process, questionnaire responses with failed attention checks are removed to screen out inattentive participants, and reverse-coded items are recoded. Our final sample contains 132 participants (48% female, average age = 29 years, range 20-72 years). Data analysis is performed using the R version 4.2.1.

4. Results

The study sheds light on the factors that influence users' preferences for interaction modalities when interacting with CAs by providing qualitative and quantitative insights.

4.1 Qualitative results from the interviews

From the interview analysis, four task characteristics, four context characteristics, and six user characteristics emerge as influencing factors for user preferences for interaction modalities, which are explained in the following with exemplary quotes from the interviewees.

The *goal-directedness or explorative* nature of a **task** (Rzepka et al., 2022), i.e., whether someone exactly "know[s] what you are looking for" (I5) or whether someone "like[s] to browse" (I2) influences the preference for text- or speech-based interaction. For example, I5 stated that when he exactly knows the restaurant, he wants to book a table at, he prefers to use the voice assistant because this saves him time (I5).

Likewise, task *complexity* (Le Bigot et al., 2007) ("when it comes to conveying a lot of information", I2 / "is too complex", I4) and a high *importance* of the task (Castelo et al., 2019), such as "writ[ing] emails to my boss" (I5) are relevant for users' preference for text- or speech-based interaction. For example, I2 prefers text-based interaction when the expected CA response contains a lot of information and complex details because he believes that speech-based interaction would be harder to understand and remember.

Also, task *sensitivity* (Cho, 2019) plays a role with interviewees mentioning highly sensitive tasks such as "medical issues" (I3) or "bank transactions" (I8) or rather less sensitive tasks such as "private messages" (I3). In particular, I3 emphasized that there is a list of topics that are too private for him to discuss via speech-based interaction, although he could imagine asking general health-related questions of a chatbot.

Regarding the **context**, the *objectivity* of the expected CA response, i.e., whether there is a "fixed answer, like what is 5+5" (I3), or subjectivity, e.g., regarding "deeper questions, political topics" (I3), where the correctness of the answer is based on personal opinion, influence the preference for one interaction modality (Castelo et al., 2019).

Furthermore, the *urgency* ("quickly and then it is done", I2) and *frequency* (Mozafari et al., 2020) ("every morning … routines" (I1) of the situation in which the CA is used as well as the social setting, i.e., whether it is a *private* ("at home", I3) or *public* ("on the train", I4) environment (Easwara Moorthy & Vu, 2015), are relevant. For example, I3 feels uncomfortable speaking to a voice assistant in public where everyone can hear his requests, or I4 feels like it is not yet "socially accepted" or "normal" to interact with voice assistants in public.

In addition, a variety of **individual characteristics** are identified as influencing users' preferences for interaction modalities. The interviews suggest that users' *rational or intuitive cognitive style* (Epstein et al., 1996) affect their preference for text- or speech-based interaction with a CA. For example, I2 stated to make purchase decisions by "read[ing] through product reviews and compar[ing]", which indicates a rational, systematic, and logic-driven approach to decision-making (Epstein et al., 1996). Others rather tend to make decisions based on gut instinct and rely on first impressions and decision heuristics (Epstein et al., 1996).

Similarly, users' *auditory or visual cognitive style* (Slack & Norwich, 2007) affects their preference for text- or speech-based interaction with a CA. While some find it easy to process auditory information and do not have difficulties remembering information that has been read to them, others find it "much easier…in writing" (I8) and can better remember information that they have seen (Slack & Norwich, 2007).

In addition, users' *desire for control* (Bakke & Henry, 2015), i.e., their inherent wish to make their own decisions and steer interactions is evident in interviewee statements: "I have worries that I do not have control over it" (I7).

Further, their *personal innovativeness in IT (PIIT)* (Agarwal & Prasad, 1998), i.e., their joy and the natural urge to experiment with new technologies ("I am technically oriented and always try out a lot", I2) and their more or less pronounced *impulsiveness* (Spinella, 2007) ("I am more someone who thinks three times before he buys something", I1) are found to be influencing factors on the preferences for interaction modalities.

Finally, users' *AI literacy*, i.e., their "set of competencies that enables individuals to critically evaluate AI technologies; communicate and collaborate effectively with AI; and use AI as a tool online, at home, and in the workplace" (Long & Magerko, 2020, p. 2) is identified as influencing user preferences for interaction modalities when interacting with CAs.

4.2 Quantitative results from the experiment

The online experiment provides additional quantitative insights into the influence of the task, context, and user characteristics identified in the interviews. To begin the analysis, we perform *manipulation checks* to test whether our scenarios successfully incorporate the intended task and context characteristics. As the data is not normally distributed, we use Mann-Whitney-U tests to test for significant differences between each of the opposite scenarios, e.g., between the scenario describing a low and high-complexity task. The results confirm that all eight scenario pairs significantly differ (p<.001) and have successfully been implemented.

Next, we test the *influence of task and context characteristics* on users' preferences for interaction modalities using one-tailed binomial tests. The binomial test tests whether the observed distribution, i.e., the proportion of users preferring text- versus speech-based interaction, for each scenario significantly differs from equal distribution. Table 2 presents the results of the binomial tests. In seven out of 16 scenarios users preferred text-based interaction over speech-based interaction; in eight scenarios it was the other way around. Only in contexts where the task is performed with high frequency, such as routines, did users choose both interaction modalities equally often. In seven scenarios significant differences could be observed: For high-complexity tasks, high-importance tasks, high-sensitivity tasks, and in public settings, users significantly preferred text-based interaction. For low-sensitivity tasks, in contexts with an objective answer or high urgency, users significantly preferred speech-based interaction.

Table 2. Results of the binomial test analysis

Task / Context Characteristic		Users' preference	Significance
Task characteristics	Goal-directed Explorative	53% text 53% speech	
	High complexity Low complexity	67% text 54% speech	***, p<.001
	High importance Low importance	77% text 57% text	***, p<.001
	High sensitivity Low sensitivity	74% text 58% speech	***, p<.001 *, p=.049
Context char.	Objective answer Subjective answer	70% speech 56% text	***, p<.001
	High urgency Low urgency	66% speech 52% speech	***, p<.001
	High frequency Low frequency	50% text 52% speech	
	Public setting Private setting	61% text 51% speech	**, p=.006
Note: ***, p<.001, ** *p<01, * p<.05, ' p<.1*			

To analyze the *influence of individual user characteristics* on users' preferences for interaction modalities, we run logistic regressions. The logistic regression tests the relationship between the predictors – i.e., the user characteristics – and the binary dependent variable – i.e., the preference for either the text- or speech-based interaction modality – by estimating the probability that users prefer text-based interaction over speech-based interaction given their individual characteristics. Table 3 presents the results of the logistic regressions, confirming the significant impact

of individual characteristics on user preferences for text- or speech-based interaction. Note that an odds ratio > 1 means that the probability of preferring text-based interaction increases; while an odds ratio < 1 means that the probability of preferring text-based interaction decreases.

Table 3. Results of the logistic regression analysis

User characteristic (i.e., predictor)	Significant effect on preference for text-based interaction	Odds ratio
Rational cognitive style (CS)	Explorative*	1.980
	High complexity**	2.186
	High urgency*	0.537
	High importance'	2.052
	Public setting'	1.594
Intuitive CS	Public setting'	0.630
Auditory CS	Low urgency*	0.441
	High complexity'	0.500
	Subjective answer'	0.600
	High frequency'	0.527
Visual CS	High frequency'	1.849
Desire for control	High sensitivity*	2.371
	Low urgency*	2.168
	High frequency*	2.102
PIIT	Explorative*	0.581
	Low sensitivity*	0.592
	Goal-directed'	0.648
	High importance'	0.588
Impulsiveness	Private'	0.551
	Low sensitivity'	1.789
AI literacy	High frequency*	0.564
	Public setting*	1.670
*Note: ** p<01, * p<.05, ' p<.1*		

For example, in situations involving highly complex tasks, a person whose rational cognitive style increases by one unit is 1.186 times (= odds ratio–1) or about 119% more likely to prefer text-based interaction over speech-based interaction. Likewise, in situations with high urgency, a person whose rational cognitive style increases by one unit is -0.463 times "more" likely to prefer text-based interaction over speech-based interaction, meaning that she is 46% more likely to prefer speech-based interaction.

5. Discussion and conclusion

Our study aimed to provide insights into the influence of task, context, and individual characteristics on user preferences for interaction modalities when interacting with CAs. While the qualitative interview results reveal a range of 14 specific characteristics, the experiment results quantitatively assess their impact.

5.1. General discussion

In the interviews, four *task characteristics* were identified as influencing factors: Interviewees reported that their decision to use text- or speech-based interaction depended on the goal-directed or exploratory nature of the task they were trying to accomplish. However, the quantitative analysis did not find a significant influence of this characteristic in the scenarios. Users preferred text- and speech-based interaction almost equally often for goal-directed and exploratory tasks (53% and 47% decision for chatbot, respectively).

Task complexity is another influencing factor, and the experiment analysis showed that users are significantly more likely to prefer text-based interaction for highly complex tasks. This finding is consistent with previous findings by Lee et al. (2001), who attributed users' preference for chatbots to the fact that text-based interaction provides the opportunity to reread the text and track information. This is underlined by our finding, that for low-complexity tasks more users prefer speech-based interaction.

Similarly, the influence of task importance could be confirmed for high-importance tasks, such as tasks that have considerable consequences if they are not completed properly. 77% of participants preferred to interact with a chatbot rather than a voice assistant to solve the highly important task presented, indicating a significant effect of task importance on users' preference for interaction modalities. Castelo et al. (2019) make a similar observation, finding that people are reluctant to trust algorithms (in general) for high-importance tasks.

The results for the task characteristic 'sensitivity' are particularly interesting, as the experiment results demonstrate that for high-sensitivity tasks (e.g., health-related issues) users are significantly more likely to prefer text-based interaction – with 74% of participants preferring the chatbot. Conversely, for low-sensitivity tasks, the voice assistant was preferred significantly more often. This is consistent with previous findings of Cho (2019), who specifically focused on health-related information. One possible explanation could be that voice assistants are often perceived as more human-like (Moriuchi, 2021), and thus users may be more hesitant to share sensitive personal information with them – as they would with real human interaction partners.

In addition to task characteristics, four *context characteristics* were identified. The objectivity of the expected CA response had a significant impact on users' preferences for interaction modalities – 70% of participants preferred speech-based interaction over text-based interaction in cases of high objectivity, i.e., where there are agreed-upon metrics to evaluate the CA

answer quality (e.g., the solution to a mathematical calculation). The interviews suggest that users' reasons for their choice are time savings and ease of use. Similarly, users are significantly more likely to prefer speech-based interaction in high-urgency situations. These findings are consistent with previous research showing that convenience and efficiency are the main drivers of voice assistant adoption (Rzepka et al., 2020).

While in the interviews, users reported preferring voice assistants over chatbots for routine tasks, the experiment analysis did not show a significant influence of high or low-frequency situations. One possible explanation could be that the influence of frequency is outweighed by the influence of task complexity. On the one hand, interviewees reported using voice assistants for simple routine tasks, such as setting timers or playing music. On the other hand, they also indicated a preference for using a chatbot for complex tasks, suggesting that task complexity may be the deciding factor. This explanation is supported by previous research. So do Rzepka et al. (2022) and Laumer et al. (2019) point out that voice assistants are more often used for simple routine tasks (e.g., listening to music), yet not for more complex tasks.

Finally, in public settings, users were significantly more likely to prefer text-based interaction, which was also indicated in the interviews. However, the influence of public or private social settings on users' preferences for interaction modalities may also depend on culture and different social norms, as indicated by previous studies (Mariani et al., 2023).

Furthermore, the influence of *users' individual characteristics* on their preference for text- or speech-based interaction was investigated. Previous research emphasizes the relevance of user characteristics in human-CA interactions. For example, Rzpeka et al. (2022) point out that there must be a match between users' individual characteristics and the interaction modality to achieve superior interaction outcomes. Similarly, Ma and Liu (2020) call for adapting the design of voice assistants to the characteristics of different user groups in order to promote their adoption for a wider range of tasks (e.g., complex or exploratory tasks). Our results further substantiate the call to bear in mind user characteristics when considering the interaction modality of a CA: The identified user characteristics exerted a significant influence in almost all (i.e., 12 of 16) scenarios in our study (see Table 3). Users who had a highly pronounced rational cognitive style were more likely to use text-based interaction when dealing with explorative, highly complex, and important tasks, as well as in public environments.

In contrast, with increasing rationality, users rather preferred speech-based interaction in highly urgent situations. With an increasingly intuitive cognitive style, users were more likely to use voice assistants in public.

Users who had a highly pronounced auditory cognitive style were more likely to use speech-based interaction for more complex tasks and in situations with low urgency, subjective answers, and high frequency. In contrast, in high-frequency situations, users with a more pronounced visual cognitive style were more likely to prefer text-based interaction.

A higher desire for control was associated with the preference for text-based interaction for highly sensitive tasks and in less urgent and more frequent situations. The relevance of the user characteristic 'desire for control' is supported by a study by Hu et al. (2022), which found that users are more likely to use voice assistants for shopping when their desire for control matches their perceived control over the AI.

Higher PIIT was associated with the preference for speech-based interaction for explorative, less sensitive, highly important, or goal-directed tasks. Similarly, Chen et al. (2021) examine chatbots and explore how cognitive fit influences interaction outcomes for goal-directed and exploratory tasks, suggesting matching information presentation formats.

With increasing impulsiveness, users preferred text-based interaction for less sensitive tasks, and speech-based interaction in private settings. Finally, with increasing AI literacy, users were more likely to interact with a voice assistant in situations with high frequency, respectively with a chatbot in public settings.

Table 4. Summary of insights from our study

When did users prefer text-based interaction?
- for highly complex tasks - for highly important tasks - for highly sensitive tasks - in public settings
when users were characterized by - a pronounced rational cognitive style - a pronounced visual cognitive style - a high desire for control
When did users prefer speech-based interaction?
- for less sensitive tasks - in contexts with an objectively correct answer - in contexts with high urgency
when users were characterized by - a pronounced intuitive cognitive style - a pronounced auditory cognitive style - a high personal innovativeness in IT

Overall, our findings show that users preferred text-based interaction for tasks that are highly complex, have high importance, or concern highly sensitive topics as well as in public contexts (Table 4). Furthermore, we

observed that chatbots were preferred over voice assistants by users who exhibited a more pronounced rational or visual cognitive style or had a high desire for control.

On the contrary, users preferred speech-based interaction for tasks that concern less sensitive topics as well as in contexts that have an objectively correct answer or are very urgent. In addition, we observed that users more likely preferred voice assistants when they exhibited a more pronounced auditory or intuitive cognitive style or had a high personal innovativeness in IT (PIIT).

5.2. Limitations

Our study has certain limitations that also pave the way for future research. First, by choosing a scenario-based experiment, we had control over confounding factors, but there is always a trade-off with realism. Although we carefully developed our scenario descriptions – and the manipulation checks support their realism – scenario-based experiments can never be as realistic as field experiments. In addition, we rely on participants' self-reports on whether they would use a text- or speech-based CA in a presented scenario. Given that humans are not perfectly aware of the thoughts and cognitive processes that lead them to react to a stimulus (Woodside, 2016), this could lead to potential biases. Therefore, future research should use field studies and observe users directly, e.g., how they interact with CAs while performing work tasks or which interaction modality they use for everyday tasks at home.

Furthermore, human-CA interactions are highly interactive experiences that are influenced by a range of factors. Although we aimed to provide a comprehensive view, there may be additional task, context, or user characteristics that we did not capture in this study. Future studies could therefore extend our findings by conducting more in-depth interviews or broader (and more exploratory) user surveys – perhaps even with a more age-diverse sample, as our sample turned out to be quite young on average.

Moreover, we used a sampling method that included different channels such as online research platforms and social media. As a result, our sample could be skewed toward people who already demonstrate a general interest in CAs. As a result, future research should take into consideration the participants' prior experience with and attitude toward CAs as control variables.

5.3. Contributions and future work

Our findings contribute to both research and practice. By investigating the factors that influence user preferences for interaction modalities, we provide a more holistic and nuanced view of human-CA interaction and thus enhance the existing knowledge. We also contribute to an understudied stream of CA research, as previous research has focused on the effects of different interaction modalities or the general adoption of CAs, disregarding the factors that influence users' preferences. Likewise, studies considering both text-based as well as speech-based interaction modalities are scarce (Diederich et al., 2022). We provide empirical evidence for influencing factors ranging from task and context characteristics to user characteristics. Thus, we do not only confirm the influence of aspects proposed in previous research (e.g., task complexity or sensitivity), but we also propose additional influencing factors, especially regarding individual user characteristics, thus extending previous research. Thereby, our findings offer valuable new insights and a potential starting point for future research.

Future studies could build on and complement our findings by investigating additional task, context, and user characteristics – focusing on specific domains (e.g., healthcare, education, banking) or specific user groups (e.g., elderly, disabled). In addition, by selecting a subset of the influencing factors presented in our study, further empirical research could be conducted in the future that looks more deeply into the interrelationships between the task, the context, and the user characteristics. In particular, field studies that collect data on users' observable decision behavior seem promising (Diederich et al., 2022). Finally, the plethora of factors that influence users' preferences for interaction modalities examined in this study could form the basis for research on the user-centered design of CAs. For example, a design science research methodology (Hevner et al., 2004) could be used to derive design principles for adapting CA design to users' characteristics, their interaction context, and the specific task requirements. Similarly, computational methods for real-time detection of users' interaction context and individual characteristics should be explored to facilitate user-centered design.

For practice, we offer guidance on which aspects to consider when implementing CAs. As firms often face resource constraints (e.g., limited budget, developers with the required skills) (Soluk & Kammerlander, 2021), they have to decide whether to implement a chatbot or a voice assistant. In these situations, our findings can provide an overview of the influencing factors and an impetus to consider aspects beyond the technical system. For example, a healthcare provider looking to offer a CA to assist with patient diagnosis could evaluate the sensitivity of tasks the CA should cover, as well as the urgency of the requests. Similarly, a bank implementing a robo-advisor might consider the

complexity of banking tasks, the goal-directedness of requests, or the importance of the tasks to the customers. In addition, the individual characteristics of the target user group should be taken into account. For example, firms could evaluate[1] whether their customers tend to make decisions rationally or intuitively, whether they have a more visual or auditory cognitive style, or how strong their desire for control might be – and then decide on the most appropriate interaction modality.

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[1] Already today, a range of algorithmic approaches exist to determine users' individual characteristics based on publicly available data (e.g., social media) or internal customer data (e.g., customer relationship management systems) (e.g., Gou et al., 2014; Yarkoni, 2010).

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