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Voice-Based Assistants as Intermediaries for Sociopolitical Issues: Investigating Use Patterns, Expectations, and Prior Indirect Experiences

ESTHER GREUSSING
EVELYN JONAS
MONIKA TADDICKEN
Technische Universität Braunschweig, Germany

The ubiquity of voice-based assistants (VBAs) in everyday life prompts an exploration of their role as information intermediaries. Surveying *n = 803* regular VBA users in Germany, we investigate the usage of VBAs for complex requests that go beyond simple factoids and provide evidence of users' expectations toward VBAs in the context of sociopolitical information. A latent profile analysis shows that while users strongly rely on VBAs for routine information activities, a significant subgroup turns to them for complex inquiries such as decision-making guidance. User expectations of VBAs when answering questions about sociopolitical issues align with those for human journalists, emphasizing impartiality, transparency, and practical support. Dialogic engagement is considered less important. These expectations appear to be shaped by distinct indirect experiences with VBAs, including observations of other users and exposure to public discourse. Offering quantitative findings, the study discusses the nuanced nature of interactions with VBAs for information retrieval.

Keywords: voice-based assistant, information retrieval, expectations, survey, latent profile analysis

Voice-based assistants (VBAs), such as Apple's Siri, Google Assistant, and Amazon's Alexa, have become increasingly prevalent in our daily lives. The popularity of VBAs can be attributed to their convenience and accessibility, enabled by built-in voice–user interfaces that understand and respond to natural language (Canziani & MacSween, 2021; McTear, Callejas, & Griol, 2016). By bridging the gap between human activity and the vast knowledge available online, they can significantly enhance users' ability to find and retrieve information across various topics, including politics, science, and health (Dambanemuya & Diakopoulos, 2021; Frehmann, Ziegele, & Rosar, 2022). In this capacity, VBAs occupy an increasingly important space in today's information environment, coexisting alongside journalism and other well-established entities (Natale & Cooke, 2021).

Esther Greussing: e.greussing@tu-braunschweig.de
Evelyn Jonas: evelyn.jonas@tu-braunschweig.de
Monika Taddicken: m.taddicken@tu-braunschweig.de
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Despite their growing presence and notable distinction from well-researched text-based search, little is currently understood about how people engage with VBAs when they serve as intermediaries that select, process, and present information to their users (Weidmüller, Etzrodt, & Engesser, 2022). This holds especially true for scenarios where users pose questions that delve into open-ended problems requiring weighing and integrating pieces of information (Chin, Fu, & Kannampallill, 2009). Yet, it is precisely these types of queries that hold significance for users, shaping their perspectives and aiding in the formation of opinions. Using survey data from Germany (n = 803), this study addresses this gap by distinguishing between different types of information queries with varying degrees of complexity. Specifically, it aims to shed light on the nuanced nature of interactions with VBAs for information retrieval (RQ1a)—an aspect often oversimplified in existing user surveys (Kinsella & Mutchler, 2018; Newman et al., 2021)—and to identify distinct groups of regular VBA users based on the types of queries they pose to their assistant (RQ1b).

In the tradition of uses and gratifications research (Katz, Blumler, & Gurevitch, 1974), individuals are assumed to make intentional choices about media selection and usage based on their needs and demands. The expectations of users, therefore, play a pivotal role in their satisfaction with the content presented (Wicke & Taddicken, 2020). So far, research has predominantly explored expectations toward the overall performance of VBAs (Fortunati, Edwards, Manganelli, Edwards, & Luca, 2022), while there has been a notable absence of investigations into expectations about information retrieval, especially concerning sociopolitical issues. Hence, this study explores whether attributes commonly associated with journalism, such as presenting information in an impartial manner (Standaert, Hanitzsch, & Dedonder, 2021), are similarly expected from VBAs when addressing issues like climate change, COVID-19, or politics (RQ2a), and whether these expectations differ across user groups (RQ2b). It further aims to understand whether these expectations are related to indirect experiences with VBAs, encompassing exposure to media coverage, commercials, and fictional narratives featuring this technology (RQ3).

Previous research has already highlighted the diverse interpretations and interactions users have with VBAs (Gruber, Hargittai, Karagolu, & Brombach, 2021). This study now takes a step forward by investigating regular users' assessment of VBAs in the context of nonfactoid queries and sociopolitical issues, a critical aspect of their role as information intermediaries (Natale & Cooke, 2021; Weidmüller, 2022). As such, it provides empirical evidence for the ongoing debate on the evolving significance of AI-based technologies in today's information environment and their potential impact on the understanding of complex, sociopolitical matters.

VBAs as Information Intermediaries

Although their technical capabilities are not yet fully mature, VBAs have the potential to become gateways for information that extends beyond weather and news updates. Most evidently, they allow users to retrieve information with a short voice command at any time, without having to pick up a device or stop other activities first (Hoy, 2018). Moreover, voice assistants share daily life and personal space with their users. They become domesticated, which leads to a feeling of intimacy and rapport that in turn might facilitate engagement with complex information. Qualitative findings by Newman (2018), for example, suggest that Amazon's Alexa tends to be treated as a family member—included in conversations and asked for "her" opinion. Hence, in line with user expectations toward experts (Wicke & Taddicken, 2020), Alexa,

Siri, or Google Assistant can create a high level of everyday life applicability and support laypersons in everyday decision making. The AI-driven, personalized nature of a VBA that builds on previous interactions with the user and adapts its communication accordingly might further contribute to this (Hancock, Naaman, & Levy, 2020).

While information is identified as one primary motivation for using a VBA (Choi & Drumwright, 2021), our knowledge of the role of VBAs in information retrieval remains inconsistent and fragmented (Cho, Lee, & Lee, 2019; Luger & Sellen, 2016). So far, studies examining the use of VBAs for information retrieval have mainly focused on news (Newman et al., 2021). In this study, we distinguish six types of queries that VBA users may ask, categorized by their level of complexity. Complexity is understood as an objective characteristic of a query type (Campbell, 1988) and is defined based on the nature of the problem: well-defined problems involve seeking a specific fact, whereas open-ended problems involve collecting various pieces of information (Chin et al., 2009). We further differentiate these two types of problems based on the types of knowledge they involve (Hoppe, Taddicken, & Reif, 2018). For well-defined problems, this is basic knowledge (i.e., general facts about an issue) and effects knowledge (i.e., facts related to causes and relationships). Open-ended problems, considered more complex than well-defined problems, involve actionable knowledge. This type of knowledge approaches a deeper understanding of issues by providing guidance in uncertain situations and aiding in decision making. This distinction aligns with the human–computer interaction literature, which varies the level of complexity in information search scenarios based on how users ask their questions, what they expect from the response, and whether there are follow-up interactions, leading to categories such as "requesting basic information" and "searching for answers" (Yang, Aurisicchio, & Baxter, 2019, p. 5). Taking this conceptualization into account, the following research question is proposed:

RQ1a: What are the prevalent types of information queries made by regular users of VBAs?

To further advance our understanding of the information practices of regular VBA users, we refine our analysis by segmenting the presumably diverse population of regular VBA users (Gruber et al., 2021; Wassmer & Schwarzenegger, 2022) into different homogeneous subgroups based on the nature of their information queries. This approach—well-established in fields such as science communication (Metag, Maier, Füchslin, Bromme, & Schäfer, 2018)—enables us to reconstruct and characterize different user groups. It offers insights into the prevalence and demographics of individuals employing VBAs for specific information needs, for instance, by focusing on technology affinity, a variable identified as relevant in this context (Luger & Sellen, 2016). We ask:

RQ1b: What groups of regular VBA users can be identified based on their query patterns?

Expectations Toward VBAs Informing About Sociopolitical Issues

People tend to apply a human-to-human interaction script when communicating with machines, treating and responding to them as if they were social actors (Gambino, Fox, & Ratan, 2020; Reeves & Nass, 1996). Consequently, VBAs are commonly attributed with social roles, such as assistants, helpers, or even friends (Choi & Drumwright, 2021; Purington, Taft, Sannon, Bazarova, & Taylor, 2017). Furthermore, individuals tend to transfer their judgment and expectation patterns developed from interactions with fellow

humans to nonhuman agents, as observed in a series of studies on social robots (e.g., Edwards, Edwards, Westerman, & Spence, 2019). This tendency to anthropomorphize technology has significant implications, particularly in the realm of VBAs, where the line between human and machine blurs (Etzrodt & Engesser, 2021): As VBAs become more adept at mimicking human responses, users might inadvertently project a level of intelligence and intentionality onto these artificial entities, leading to expectations that could mirror those they have in human relationships.

In fact, studies have shown that people attribute communicative agency to VBAs, as they do not perceive them as mere communication channels, but as genuine sources of communication (Guzman, 2019). A more relational engagement with VBAs can even increase its use for functional purposes such as information retrieval (Xu & Li, 2022). When asked questions about sociopolitical issues such as climate change or the COVID-19 pandemic, VBAs act as information intermediaries that select and disseminate information, similar to journalists (Frehmann et al., 2022; Weidmüller, 2022). Obviously, there are clear distinctions between journalists and VBAs: While journalists follow ethical codes and editorial policies, VBAs operate on algorithms and data analysis. Nevertheless, as VBAs continue to be attributed with human traits and social behavior (Gambino et al., 2020), questions arise about users' expectations concerning their communication of sociopolitical issues, particularly in comparison with human information intermediaries. Simply put, if users perceive VBAs as social actors, they might also anticipate them to deliver information with a level of credibility, accuracy, and neutrality akin to professional journalists. This prompts an exploration of VBAs as information intermediaries based on theoretical insights from journalism studies.

Although there is a wide range of audience expectations toward journalists discussed in the literature (Banjac, 2022; Eldridge & Steel, 2016), it is widely agreed among audiences and practitioners that one of the primary functions of journalism in democratic societies is to provide accurate and relevant information while maintaining a neutral stance and avoiding subjective influence in reporting (Loosen, Reimer, & Hölig, 2020; Riedl & Eberl, 2022; Standaert et al., 2021). In addition to informing and observing, journalism also plays an analytical-deliberative role (Hanitzsch & Vos, 2018) by analyzing current events and situating them within a broader context, providing citizens with arguments and perspectives for public deliberation. Furthermore, both audiences and journalists highly value the watchdog function of journalism, which involves critical monitoring of those in power (Willnat, Weaver, & Wilhoit, 2019). Extant research has highlighted the significance of journalistic roles that extend beyond the political realm and cater to citizens' everyday lives, such as providing guidance and advice related to personal matters (Hanitzsch & Vos, 2018). Loosen et al. (2020) further suggest considering new journalistic tasks associated with audience participation or transparency. In their empirical study, they found that transparency about sources was one aspect German citizens considered highly important for journalism.

To understand whether regular users of VBAs hold comparable expectations from the assistants in communicating sociopolitical issues as the ones we know from journalism studies, we pose the following research question:

RQ2a: What expectations do regular users of VBAs have regarding the responses they receive from their assistant when inquiring about sociopolitical issues?

Previous research in journalism indicates that individuals develop (normative) expectations based on their own usage practices (Wilhelm & Detel, 2023), for instance, in relation to their perceptions of actual media performance (Fawzi & Mothes, 2020). According to Vos, Eichholz, and Karaliova (2019), advocating for the importance of news consumption, understood as being more actively engaged in news, further leads to heightened expectations for journalists. Similarly, in the context of science communication, highly involved individuals appear to have the highest expectations for the goals science communication should achieve (Wicke & Taddicken, 2020). It is, therefore, plausible that a relationship exists between individuals displaying particular usage patterns of their VBA's information retrieval function (e.g., employing it for complex queries) and the expectations they harbor toward these assistants when responding to sociopolitical queries.

RQ2b: How do different groups of regular VBA users differ in their expectations for VBAs to answer questions about sociopolitical issues?

Influence of Indirect Experiences With VBAs

Beyond their personal use of VBAs, individuals' expectations about VBAs may also be shaped through learning by observing others' usage (Bandura, 2008) or through exposure to public narratives related to artificial intelligence and voice–user interfaces (Bao et al., 2022; Fortunati et al., 2022). Of central importance, therefore, are the information and arguments presented in the media, particularly the news media (Bingaman, Brewer, Paintsil, & Wilson, 2021; Dogruel, Facciorusso, & Stark, 2022). Artificial intelligence is also a popular topic in pop culture, exploring the conflict between humans and AI and raising questions about the humanity of machines (Humphry & Chesher, 2021; Natale & Ballatore, 2020). Apart from information disseminated by journalists or fictional narrators, public discourse comprises direct information from companies that develop and sell VBAs (Bory, 2019). Commercials provide insight into how emerging technologies are envisioned to be integrated into daily life and the broader culture of society (Kopitz, 2021). Hence, they are considered to play a vital role in determining the significance of these technologies in society, particularly when their uses are not yet fully realized (Natale & Cooke, 2021).

In this study, expectations from VBAs entail professional values they may adhere to when communicating sociopolitical issues. These expectations may be shaped by individuals' indirect experiences with VBAs. For instance, existing research indicates that news media raise ethical concerns related to AI in general (Brennen, Howard, & Nielsen, 2020) and with voice–user interfaces specifically (Sin, Munteanu, Chen, & Threatt, 2023), focusing on issues such as privacy and algorithmic bias. Company commercials also convey a specific image of the technology—such as Google Assistant being depicted as an all-knowing, omnipresent oracle (Natale, 2020). Hence, indirect experiences with VBAs may not only influence perceptions of the technology's capabilities in providing practical support and engaging in dialogue but also expectations about the VBAs' impartiality and transparency. This includes disclosing information sources and addressing uncertainties related to the subject matter.

Indirect experiences can overlap or even contradict each other (Toff & Nielsen, 2018). In this sense, an interview study by Gruber et al. (2021) suggests that there is no common basis for understanding VBAs,

with each individual possessing a unique perspective based on their own sources of information. By shedding a more systematic light on the role of indirect experiences with VBAs and their influence on users' expectations in the realm of sociopolitical issues, our final research question is as follows:

RQ3: Are the expectations of regular users toward VBAs when inquiring about sociopolitical issues related to their indirect experiences with VBAs acquired through (a) observing others' usage, (b) media coverage, (c) fictional narratives, and (d) commercials?

Methods

The study draws on a subsample of regular users of VBAs (n = 803) obtained from a larger survey of the German population investigating everyday communication practices. The regular users of VBAs make up 42.4% of the total sample. Participants were recruited by Qualtrics, which promoted the online survey to their panel in August and September 2022. The sample is based on quota distributions of gender, age, and education in Germany and includes participants from all German federal states. To ensure data quality, we eliminated speeders who completed the survey in an unusually short time. Sixty-one individuals with duration times below 40% of the median duration (= below 5.3 minutes) were removed (see Reif, Taddicken, Guenther, Schröder, & Weingart, 2023 for a similar approach). Additionally, 20 individuals were removed because of a technical issue that affected the filtering mechanism. As a result of these measurements, the final sample includes fewer individuals with a middle-level education and a higher proportion of older individuals compared with the general population. The final sample size is N = 1,893 survey participants.

The n = 803 regular VBA users in this survey are defined as individuals who indicate a score of at least 5 on a question assessing their frequency of VBA usage, which ranges from 1 (never) to 7 (very often). Of those who use VBAs regularly, 52.1% identify as men; their mean age is 43.9 years (SD = 14.6), and their median age is 44 years (see Supplementary Figure S1 for a histogram of the age distribution). The majority of them report holding a secondary education degree that qualifies for university entrance (32.9%) or a university degree (35.1%) as their highest educational qualification. In addition, 58.5% of regular VBA users live in childless households, and 22.5% have a net household income of €2,000 to €3,500. For more details, see Supplementary Table S1.[1]

When asked about the voice-based systems and devices used, among the 803 regular VBA users, Amazon's Alexa stands out as the predominant choice, with 51.7% reporting using it regularly, followed by Apple's Siri (29.9%) and Google Assistant/Google Now (29.6%). In contrast, Microsoft's Cortana and Samsung's Bixby claim the smallest share, with only 11.7% and 10.8% of respondents, respectively. Regarding the device used for engaging with a VBA, mobile phones emerge as the most commonly used (M = 5.3, SD = 1.9), as measured on a 7-point scale where 1 signifies "never" and 7 signifies "very often." Following closely are smart speakers (M = 4.6, SD = 2.4). Laptops, computers (M = 3.4, SD = 2.2), and tablets (M = 3.4, SD = 2.2) are used less often for engaging with a VBA. The regular VBA users further indicate a preference for using a VBA when they are at home, either alone (M = 5.5, SD = 1.6) or in the

[1] The supplementary material is stored at https://ogy.de/vba2024

company with family or friends (M = 4.6, SD = 1.9), as measured on a 7-point scale where 1 signifies "never" and 7 signifies "very often."

Measurements

To measure the *types of information queries posed* by regular users of VBAs, we developed items assessing the frequency with which participants directed six specific types of queries to the VBA. According to our conceptualization, these queries encompass low complexity questions, including those about specific facts (e.g., the distance from the Earth to the Moon), everyday life (e.g., weather and traffic), current events (e.g., news), and causes and relationships (e.g., understanding the consequences of climate change). The inclusion of everyday life and current event queries reflects their common association with VBA use (Newman et al., 2021). Additionally, we included high complexity questions, namely those related to guidance in situations of uncertainty or problems (e.g., assessing the danger of aluminum in deodorant) and those related to decision making (e.g., weighing the pros and cons of electric cars). The frequency of these queries was measured on a 7-point scale (1 = very seldom or never; 7 = daily).

Our measurement of *expectations toward VBAs* involved eight items, based on Loosen et al. (2020). Participants were instructed to envision a scenario in which a VBA answered queries related to climate change, the COVID-19 pandemic, or politics. Following this, they were tasked with rating the importance of each of the eight items for VBAs in such a role on a 7-point scale. For the data analysis, six of the eight individual items were aggregated, pairing two items each (see Table 1). Conceptually, the two remaining items refer to expectations regarding transparency. However, because of low reliability, they are treated as separate items.

Table 1. Expectations Toward VBAs.

Expectations	Aggregated to	Spearman-Brown Coefficient	*M* (*SD*)	*n*
To tell me the sources of the information			5.3 (1.5)	785
To tell me what is not known or uncertain			5.2 (1.6)	785
To be a neutral source of information To contextualize and analyze information	Impartial interpretation	.76	5.3 (1.3)	786
To provide advice and guidance To offer assistance for everyday life	Practical support	.79	5.3 (1.4)	785
To provide topics for conversation To engage in a dialogue with me	Dialogic engagement	.79	4.4 (1.7)	783

Note. Question wording: "Please think about how a voice assistant answers questions about climate change, the coronavirus pandemic, or politics. How important do you think the following things are for voice assistants in this role?" (7-point scale). The sample size varies because of missing values.

Indirect experiences with VBAs were measured with four items (7-point scale), inspired by Weidmüller (2022). Specifically, we asked how often participants came in contact with a VBA in smartphones, laptops, tablets, or smart speakers, encompassing four avenues: observing others' usage; media coverage; fictional narratives such as in movies, books, or TV series; and commercials.

Furthermore, we assessed *affinity for technology* (four items; Wessel, Attig, & Franke, 2019), *interest for the topic of artificial intelligence* (one self-derived item), and *tendency to perceive the VBA as person*. Both affinity for technology (M = 4.6, SD = 1.2) and interest in AI (M = 5.5, SD = 1.3) were on a rather high level, given the 7-point scale. The tendency to perceive the VBA as a person was measured with one item based on Etzrodt and Engesser (2021), providing participants with a rating scale ranging from 0 (thing/object) to 100 (person/subject) while asking, "Please imagine that a voice assistant is answering a question about climate change, the COVID-19 pandemic, or politics. What do you think, in this situation, is the voice assistant more like a thing (object) or more like a person (subject) to you?" For the subsequent analysis, we divided the scale by 10, estimating a mean rating of M = 4.2 (SD = 3.0).

Results

RQ1a/b: Different Types of Information Queries and Corresponding Groups of Users

Commencing with outlining how often regular users of VBAs request different types of information (RQ1a), it appears that all six question types under study are actively employed. However, users demonstrate a propensity for certain types: Questions about everyday life demonstrate the highest mean (M = 5.1, SD = 1.9, measured on a 7-point scale), underscoring their regular and consistent occurrence. Questions about current events also exhibit a relatively high mean (M = 4.7, SD = 2.0), followed by questions about specific facts (M = 4.2, SD = 1.9). Guidance in decision making, categorized as a high complexity question, is least frequently used (M = 3.5, SD = 2.1). Questions seeking guidance in problem-solving and those pertaining to causes and relationships fall in between, as outlined in Table 2. Examining the prevalence of different query types across demographic groups, no significant differences are observed in questions about everyday life and current events. However, older adults (55+ years) and women tend to use their VBAs less frequently for the remaining four query types.[2]

[2] For an overview of the question types and expectations towards VBAs across different demographics, see Supplementary Table S4a/b.

Table 2. Frequency of VBA Query Types.

Query type	Level of complexity	*M* (*SD*)	*n*
Questions about everyday life (e.g., weather and traffic)	Low	5.1 (1.9)	796
Questions about current events (e.g., news)	Low	4.7 (2.0)	794
Questions about specific facts (e.g., the distance from the Earth to the Moon)	Low	4.2 (1.9)	789
Questions for guidance in situations of uncertainty or problems (e.g., assessing the danger of aluminum in deodorant)	High	3.8 (2.0)	794
Questions about causes and relationships (e.g., understanding the consequences of climate change)	Low	3.8 (2.0)	796
Questions for guidance in decision making (e.g., weighing the pros and cons of electric cars)	High	3.5 (2.1)	789

Note. Question wording: "Voice assistants can answer a wide variety of questions. How often do you ask the voice assistant the following questions?" (1 = "very seldom or never," 7 = "daily"). The sample size varies because of missing values.

To further identify distinct user groups of voice-based query patterns (RQ1b), we conducted a latent profile analysis (LPA) using the frequency of six types of information queries as indicator variables. LPA aims to discern distinct latent groups within a given population—characterized by similarities in their responses to a predefined set of variables—and computes the probability of an individual belonging to a specific latent group. This allows us to then describe the groups by estimating the mean differences for the identifying variables among these groups. Compared with cluster analysis, LPA is increasingly favored as a more effective analytical approach for uncovering subpopulations as it allows for comparing different models based on how well they fit the data (Hine et al., 2014). For model selection, we employ several model fit indices, encompassing the Akaike information criterion (AIC), Bayesian information criterion (BIC), sample-adjusted Bayesian information criterion (SABIC), Bootstrapped Likelihood Ratio Test (BLRT), entropy, and class size. In line with prior studies (Metag et al., 2018), we also evaluate the interpretability and content value of the suggested latent groups; that is, whether adding a new group indeed comes with new insights.

Using the R package *tidyLPA* (Rosenberg, Beymer, Anderson, van Lissa, & Schmidt, 2018), the LPA revealed a total of nine latent groups (see Supplementary Table S2). It appears that the AIC, BIC, and SABIC consistently decreased with the introduction of each additional group; however, the gains in model fit diminished notably after the six-group solution. The eight- and nine-group solutions exhibited superior model fits, as evidenced by low AIC, BIC, and SABIC values, but the models' interpretability was compromised because of the small group sizes (below 5%). Since the BLRT did not indicate a favorable model ($p < .01$), we further considered entropy—a high entropy value indicating the confident classification of respondents into specific groups—and the substantive information associated with an extra group. In light of these considerations, and to balance model fit and interpretability, we ultimately opted for the five-group model. These five groups differ not only in the overall frequency of information requests directed to a VBA but also in the prevalence of specific types of queries within each group. We named the groups according to their main characteristics (Figure 1).

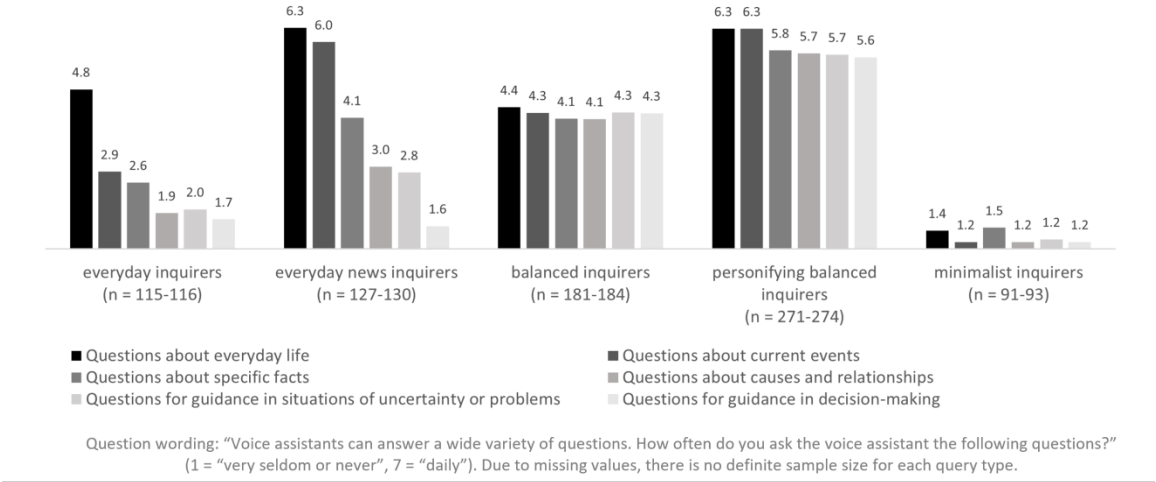


Figure 1. Distribution of query types across latent groups: Mean values.

Using an ANOVA with Bonferroni post-hoc test, we further characterize each group based on factors such as age, tech affinity, interest in AI, and tendency to perceive the VBA as a person. Additionally, we provide an overview of the groups with respect to their gender and education (see Supplementary Table S3).

The user group named "everyday inquirers" (n = 117[3], 14.6%) exhibits a pronounced preference for queries related to everyday life (M = 4.8, SD = 1.3; measured on a 7-point scale). Although the VBA is occasionally used for questions about current events and specific facts, the complexity of the query type corresponds inversely with its usage, with questions guiding decision making being the least frequently used (M = 1.7, SD = 1.0). The user group named "everyday news inquirers" (n = 131[3], 16.3%) similarly displays a clear preference toward queries about everyday life (M = 6.3, SD = 0.8) and questions about current events (M = 6.0, SD = 0.9). Individuals in this group engage in a diverse array of query types, including questions about causes and relationships and guidance in problem-solving. Compared with the "everyday inquirers," they demonstrate a higher frequency of resorting to the VBA for information retrieval, yet rarely pose queries for decision-making guidance (M = 1.6, SD = 0.8). Both groups have a higher percentage of female users than male users (53% and 58%, respectively). Their average age is around 46 years.

The user groups named "balanced inquirers" (n = 186[3], 23.2%) and "personifying balanced inquirers" (n = 275[3], 34.2%) exhibit more evenly distributed patterns of query type frequency. Notably, the latter distinguishes itself with a high frequency of using the VBA for information retrieval. This is also true for complex query types, with a mean frequency of 5.6 (SD = 1.1) for questions related to guidance in decision making. As the largest segment of regular users at 34.2%, "personifying balanced inquirers" underscore the pivotal role played by complex query types in VBA information retrieval. Predominantly male

[3] This group size refers to the LPA, which is based on the total sample size (n = 803).

(60%), with 39% holding a tertiary education degree, this group deviates from the average regular VBA users in Germany by having a higher proportion of males and more individuals with higher education. In addition, it exhibits significantly higher levels of both interest in AI (M = 6.1, SD = 1.1) and the tendency to perceive the VBA as a person (M = 5.9, SD = 2.8; 10-point scale) compared with all other user groups. Their tech affinity is at 4.8 (SD = 1.2). "Balanced inquirers" have the second-highest tendency to view the VBA as a person (M = 4.2, SD = 2.7)—significantly surpassing the remaining three groups, but already located in the lower half of the 10-point scale. Furthermore, the "balanced inquirers" are rather male (54%) and represent the youngest user group, with an average age of 40. The average age of "personifying balanced inquirers" is 43.

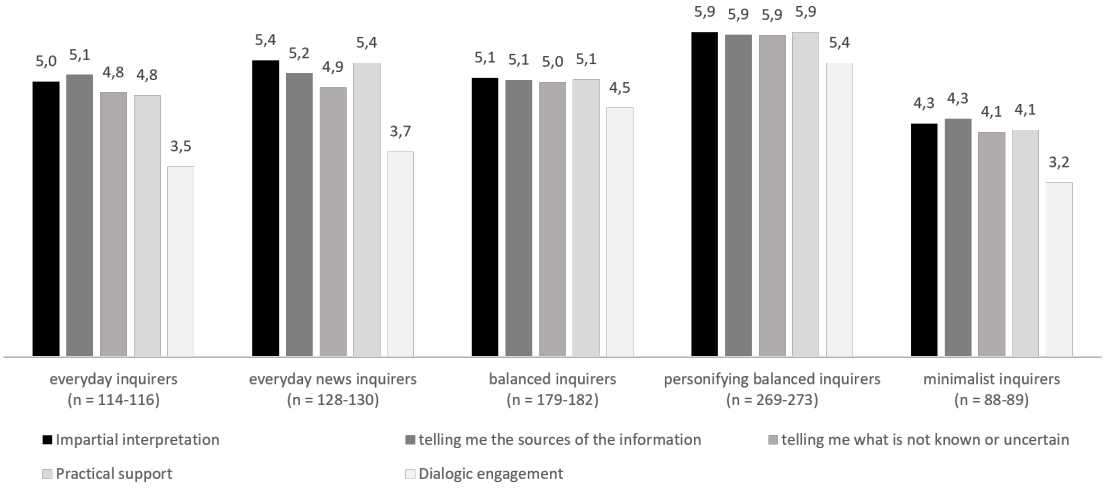
In contrast, the user group named "minimalist inquirers" (n = 94[3], 11.7%) comprises individuals who seldom pose the studied queries. It seems they use the VBA for purposes other than information retrieval, with the highest frequency observed for questions about specific facts (M = 1.5, SD = 1.1), closely followed by questions about everyday life (M = 1.4, SD = 0.8). This user group is characterized by lower levels of interest in AI (M = 4.9, SD = 1.4) and a clearly reduced tendency to perceive the VBA as a person (M = 2.2, SD = 2.4). Averaging 49 years, this group is also five years older than the average regular VBA users in Germany.

RQ2a/b: Expectations Toward VBAs Concerning the Responses When Inquiring About Sociopolitical Issues and Corresponding Groups of Users

The descriptive statistics (RQ2a) provide insights into what people expect from a VBA that conveys information on sociopolitical issues. The mean values are nearly identical for most expectations: *Impartial interpretation* has a mean value of M = 5.3 (SD = 1.3), indicating that people highly appreciate obtaining contextualized information free from any particular perspective or bias. *Practical support* also has a mean value of M = 5.3 (SD = 1.4), as does transparency in terms of *telling me the sources of the information* (M = 5.3, SD = 1.5). Transparency about *telling me what is not known or uncertain* has a slightly lower mean value of M = 5.2 (SD = 1.6). Interestingly, conversational interaction features, which are a key characteristic of VBAs, rank the lowest (*dialogic engagement*; M = 4.4, SD = 1.7), but, on average, they are still located in the upper half of the 7-point scale. Overall, these findings indicate that for sociopolitical issues, providing neutral, transparent, and practical information is of central importance, outperforming conversational aspects.

ANOVAs with Bonferroni post-hoc tests reveal differences in these expectations among the previously identified five latent groups (RQ2b; see Figure 2). Across all user groups, there is a shared emphasis on the significance of VBAs presenting information impartially and transparently (with "telling me the sources of the information" receiving slightly higher ratings than "telling me what is not known or uncertain"), as well as providing practical support. In contrast, the significance assigned to dialogic engagement remains subordinate. A noteworthy observation, however, is the heightened preference for dialogic engagement among the "personifying balanced inquirers" (M = 5.4, SD = 1.3) and the "balanced inquirers" (M = 4.5, SD = 1.3), as these two groups also leverage VBAs for complex queries. Overall, the mean values for expectations follow a distinct pattern, with "personifying balanced inquirers" exhibiting significantly higher mean values than all the other groups. Conversely, the "minimalist inquirers" exhibit

significantly lower rankings, except for dialogic engagement. Here, a significant difference is observed only in comparison with the "personifying balanced inquirers" and the "balanced inquirers." This pattern suggests that increased usage of VBAs for information retrieval is associated with more pronounced expectations.



Question wording: "Please think about how a voice assistant answers questions about climate change, the coronavirus pandemic or politics. How important do you think the following things are for voice assistants in this role?" (7-point scale).
Due to missing values, there is no definite sample size for each expectation.

Figure 2. Distribution of expectations toward VBAs across latent groups: Mean values.

RQ3: Relationship Between Indirect Experiences With and Expectations Toward VBAs

Finally, to investigate indirect experiences with VBAs as potential predictors of what is expected from VBAs when answering questions about sociopolitical issues, we conducted a series of five regression analyses, each focusing on one specific expectation dimension. Considering the characteristics of the latent user groups, we include age, gender, education, and self-reported interest in artificial intelligence as control variables in each model, alongside affinity for technology and tendency to perceive VBA as a person. Moreover, we included four single items measuring indirect experiences with VBAs through (1) observing others' usage, (2) media coverage, (3) fictional narratives, and (4) commercials as central predictors of the dependent variable (see Table 3).

Table 3. Regression Models Predicting Expectations Toward a VBA When Answering Questions About Sociopolitical Issues.

	Impartial interpretation (Adj. R^2 = 15.3%)			Telling me the sources of the information (Adj. R^2 = 10.7%)		
	B	*SE*	β	*B*	*SE*	β
Intercept	1.742***	.371		1.928***	.428	
Age	.010	.003	.108**	.012	.004	.113**
Gender (ref. male)	.295	.095	.109**	.181	.110	.059
Education (ref. secondary (second stage))						
Secondary (first stage)	.091	.117	.032	−.053	.136	−.016
Tertiary	−.021	.111	−.008	.008	.130	.002
Interest in AI	.188	.040	.178***	.184	.046	.155***
Tech affinity	.141	.041	.126***	.157	.047	.122**
Tendency to perceive the VBA as person	.079	.016	.178***	.075	.019	.148***
Predictors						
Observing others' usage	.058	.035	.070	.078	.040	.083
Media coverage	−.001	.038	−.002	−.050	.045	−.051
Fictional narratives	.040	.035	.051	.046	.041	.051
Commercials	.050	.037	.062	.044	.043	.048

	Telling me what is not known or uncertain (Adj. R^2 = 13.5)			Practical support (Adj. R^2 = 18.8%)		
	B	*SE*	β	*B*	*SE*	β
Intercept	1.696***	.435		1.635***	.368	
Age	.012	.004	.112**	.010	.003	.107**
Gender (ref. male)	.291	.112	.091**	.246	.094	.090**
Education (ref. secondary (second stage))						
Secondary (first stage)	.167	.138	.049	.179	.116	.061
Tertiary	.125	.132	.038	−.057	.110	−.020
Interest in AI	.135	.047	.109**	.238	.040	.223***
Tech affinity	.060	.048	.045	.076	.040	.067
Tendency to perceive the VBA as person	.119	.019	.227***	.096	.016	.214***
Predictors						
Observing others' usage	.113	.041	.117**	.041	.034	.049
Media coverage	.050	.045	.049	.006	.038	.007

Fictional narratives	−.025	.042	−.028	.029	.035	.036
Commercials	.056	.044	.059	.082	.037	.100*

Dialogic engagement (Adj. R^2 = 31.1%)			
	B	*SE*	β
Intercept	1.088**	.411	
Age	.001	.004	.006
Gender (ref. male)	−.043	.105	−.013
Education (ref. secondary (second stage))			
Secondary (first stage)	.274	.130	.077*
Tertiary	.181	.123	.052
Interest in AI	.208	.045	.161***
Tech affinity	−.008	.045	−.006
Tendency to perceive the VBA as person	.203	.018	.373***
Predictors			
Observing others' usage	.018	.038	.017
Media coverage	.090	.043	.086*
Fictional narratives	.104	.039	.108**
Commercials	.059	.041	.060

Note. * p < .05, ** p < .01, *** p < .001.

In each of the five regression models, the beta coefficients of tendency to perceive the VBA as a person yield statistical significance, apparently playing a consistent and important role in shaping users' expectations toward VBAs that convey information about sociopolitical issues. Apart from "telling me what is not known or uncertain," the same holds for interest in AI. Tendency to perceive the VBA as a person is a particularly strong predictor for the expectation of dialogical engagement (β = .373, p < .001).

Overall, the results provide only partial support for the assumed relationship between indirect experiences with VBAs and expectations about their responses to sociopolitical issues. Notably, there is no significant association between the expectation of impartial interpretation and "telling me the sources of the information" and any of the four examined indirect experiences (p > .05).

However, the expectation of impartial interpretation is significantly associated with all covariates in the model except for education. Conversely, distinct patterns emerge for the other three expectation dimensions: "Telling me what is now known or uncertain" is associated with the observation of other users (β = .117, p = .006), practical support is associated with exposure to commercials (β = .100, p = .027), and dialogical engagement is associated with both media coverage (β = .086, p = .035) and fictional

narratives (β = .108, p = .008). These results suggest that certain indirect experiences may be more influential than others in shaping people's expectations of VBAs in specific ways.

Discussion

The present study provides insights into VBAs as new information intermediaries for sociopolitical issues from a user's perspective. Drawing on a survey of regular users of VBAs in Germany (n = 803), our findings reveal a strong dependence on VBAs for everyday routine information activities, such as checking the weather or news—a trend consistent with existing literature (Wassmer & Schwarzenegger, 2022). However, our LPA identified a substantial subgroup within the regular VBA users that frequently turns to VBAs for complex inquiries, including seeking guidance in decision-making processes ("personifying balanced inquirers"). For these users, VBAs clearly transcend being mere tools for basic tasks. This indicates a potential shift in how users gather information at a time when AI-based tools have become ubiquitous. Specifically, VBAs might indeed reshape how individuals navigate and comprehend the world (Natale & Cooke, 2021), prompting questions about the authority of these entities in shaping individual perspectives and forming opinions on sociopolitical issues. As these systems affect knowledge acquisition, decision making, and opinion formation, they could transform the role of human agency in an increasingly automated world. This shift underscores the need for a deeper examination of the ethical implications, transparency, and accountability of VBAs, especially given the potential biases and limitations embedded in their algorithms (Dambanemuya & Diakopoulos, 2021). Hence, VBAs, with their unique characteristics, may deserve more attention in scholarly discussions about information intermediaries (Frehmann et al., 2022).

The convenience offered by the voice–user interface is counterbalanced by the risk of receiving insufficient information. Instead of relying on editorial curation, VBAs collect, weigh, and aggregate information based on factors such as relevance to a search term and users' preferences. They reduce information to a brief piece on behalf of their users, while obscuring the range of arguments and sources available in the background (Natale & Cooke, 2021). This line of thought is further enriched by our finding that "personifying balanced inquirers" perceive the VBA as most human-like, which also supports prior work observing a link between relational and functional use of a VBA (Xu & Li, 2022). This perception might diminish critical engagement with the information received, highlighting the necessity for further research in this area. Future studies should explore the role of VBAs within users' media repertoires to determine whether VBAs compete with established search tools like Google Search or even institutions like journalism.

However, information retrieval through VBAs is diverse in nature. A considerable number of regular users appear not to use VBAs for handling complex queries, particularly within the realm of decision making ("everyday (news) inquirers"). Consequently, our study advocates for a more nuanced assessment of the overarching function of information retrieval in studying VBA usage, as users exhibit a spectrum of query types when engaging with VBAs in this respect that otherwise remains invisible.

In addition to informational behavior, our study explored the expectations of regular users for a VBA that addresses sociopolitical issues. Notably, and similar to expectations directed at human journalists

(Riedl & Eberl, 2022), it seems that a shared baseline of expectation exists across all user groups, emphasizing the importance of impartial interpretation, transparency, and practical support from VBAs. Despite the unique conversational features of VBAs (Hoy, 2018), dialogic engagement is considered less important. User groups utilizing VBAs for complex queries ("(personifying) balanced inquirers") exhibit a heightened expectation for dialogic interaction compared with other user groups. Conversely, the user group that rarely employs VBAs for information retrieval ("minimalist inquirers") records the lowest mean ratings across all expectations. This implies a dynamic relationship between user expectations, the complexity of queries, and the extent of reliance on VBAs for information. In other words, expectations are not static but rather evolve based on ongoing interactions with VBAs (Vos et al., 2019).

Examining the role of indirect experiences with VBAs offers further insights into the multifaceted nature of these expectations. Notably, each dimension of expectation is linked to distinct indirect experiences, lacking a unifying pattern. Telling what is not known or uncertain, for instance, is associated with the observation of others using a VBA. Practical support, by contrast, is associated with exposure to commercials, while dialogical engagement is associated with both media coverage and fictional narratives. This suggests a broader influence of public discourse, shaping the narrative around VBAs as supportive assistants and social companions (Natale & Ballatore, 2020). Furthermore, the findings emphasize the substantial influence of interest in artificial intelligence and the perception of VBAs as persons on regular users' expectations of VBAs. The human–machine communication literature suggests that users tend to attribute human-like qualities to VBAs, viewing them as entities with personality and agency (Etzrodt & Engesser, 2021; Guzman, 2019). Adopting a human-centered perspective and leveraging a well-established framework in journalism studies (Loosen et al., 2020), as exemplified in our research, therefore proves to be a fruitful approach for ongoing investigations into user perceptions, expectations, and interactions with VBA technology.

The survey's quantitative nature inherently limits the depth of insights gained into how diverse user groups engage with their VBAs. We thus recommend further qualitative studies exploring the use of VBAs for information retrieval in the context of sociopolitical issues, helping to enrich, contextualize, and complement the quantitative data obtained (van der Goot & Etzrod, 2023). This would involve uncovering a broader spectrum of question types posed by regular VBA users, as the six categories investigated in our study may not be exhaustive. Additionally, a re-examination of the baseline expectations among all identified user groups that emerged in our data is warranted. This reassessment should consider potential variations, such as specific usage scenarios or the nature of sociopolitical issues addressed in user queries.

Another limitation is the lack of assessment about how long participants have been using their VBAs (i.e., whether they are novices). Subsequent studies could leverage this information to test the stability of user groups over time. For instance, investigating whether users may use complex queries only in the beginning and then, in the long run, use them mainly for routine tasks (Cho et al., 2019). Furthermore, it will be interesting to see whether user group dynamics evolve with the introduction of novel AI-based information intermediaries, such as Open AI's ChatGPT.

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