# A Pilot Study for Understanding Users' Attitudes Towards a Conversational Agent for News Recommendation

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## ABSTRACT

Conversational recommender agents have been rapidly developed and applied in various domains (e.g., amusement, e-commerce, tourism) in recent years, to allow users to easily access information or service through natural communication with the system. However, little attention has been paid to the news domain, though some news organizations (e.g., ABC, BBC) have started to deploy news chatbots to engage with audiences. In this work, we performed a pilot study in form of a semi-structured interview for the purpose of knowing important features of recommendations users expect when they interact with a news conversational agent. In particular, in order to acquire users' thoughtful feedback, we implemented a prototype system based on a taxonomy that covers all of the major recommendation-seeking and information-searching goals according to related literature. The interview results reveal users' opinions on various aspects of a conversational agent for news recommendation, including the condition under which they may request/accept the news recommendation by a conversational agent, important features of the conversational news recommendation they expect, and their preferred preference elicitation strategy. Several practical implications are concluded at the end, which might inspire the design and development of effective conversational agents in the news domain.

## CCS CONCEPTS

• **Human-centered computing** → **Empirical studies in HCI**; *Interactive systems and tools.*

## KEYWORDS

Conversational recommender agents, news chatbots, interview study, qualitative results

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## 1 INTRODUCTION

Nowadays, conversational recommender agents have become increasingly popular in various domains, such as amusement, e-commerce, tourism, education, and healthcare [1, 2, 9, 23]. It is typically accessed via a text or speech based dialogue system, with the goal of automating communication and supporting customized information or service acquisition (e.g., finding a song to listen, or a product to buy) [4, 7, 23, 25]. In the digital media domain, the news chatbot has become an emerging trend of news delivery, as it not only makes the news more engaging and better suited to social media and messaging platforms, but also is likely to attract the younger readers owing to the chatbot's "less formal and more conversational style" [15]. As stated in a recent paper by BBC news [10], "news chatbots exemplify a rise in 'conversational journalism' approaches that aim to engage people who are traditionally not users of news through the leveraging of new technologies to create formats that are informal, interactive and novel."

However, most existing commercial news chatbots have limited recommendation ability. According to a recent user survey conducted on several social media instant messaging tools as operated by major media organizations (e.g., ABC News, BBC News, and NBC News), most of them were not able to respond to users' recommendation requests [26]. Moreover, little research work has studied users' attitudes towards a conversational agent for news recommendation [14], although there have been emerging user studies in other application domains (e.g., conversational agents for music, movies, or e-commerce product recommendations) [5, 9, 16, 25].

Given that news essentially act as a type of information about certain events for users to know [12, 18], which differ from other


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types of products such as music for meeting users' entertainment needs or e-commerce products for shopping goals, it should be interesting to understand what kind of news recommendation users might expect to receive in the conversational setting and what system design features may influence user experience. Therefore, in this work, we have conducted a pilot study in form of a semi-structured interview (with 10 participants) to understand the critical features of recommendations users might expect when they interact with a news conversational agent. In particular, in order to acquire users' thoughtful and in-depth feedback during the interview, we asked them to first interact with a prototype system that was built centered around a taxonomy that covers all of the major recommendation-seeking and information-searching goals according to related literature [11, 21, 26].

The interview results reveal users' opinions on various aspects of a conversational agent for news recommendation, including the conditions under which they may request/accept the news recommendation by a conversational agent, their expected features of the conversational news recommendation, and preferred preference elicitation strategy. In the following, we first introduce the study setup (including the material and participants) and then the major findings from the interview.

## 2 PILOT STUDY

### 2.1 Material

Because existing commercial news chatbots were not very competent to respond to users' recommendation requests according to a recent survey [26], as well as the lack of a functional Chinese news chatbot for our participants (all native Chinese) to use at the time of our experiment, we developed a prototype system for this pilot study. Specifically, this prototype was implemented based on a taxonomy [26] that accommodates users' major recommendation-seeking goals in natural language interaction (i.e., ***objective*** goal "as a request that can be answered without controversy" and ***subjective*** goal "as a request that involves judgment, uncertainty, and/or personalization") [11], and information-searching goals (i.e., ***informational*** goal for "obtaining information about the query topic", ***resource*** goal "for obtaining something (other than information)", and ***navigational*** goal "as demonstrating a desire by the user to be taken to the home page of the institution or organization in question") [21] (see Table 1). We believe that, with the support of such taxonomy-driven interaction, our prototype system may allow users to obtain some intuitive interaction experiences related to its news searching and recommendation functions. We concretely designed 22 sample questions (each for one particular type of goal) about Covid-19 and asked users to issue similar requests when they interacted with the system (see Table 1). The reason we chose Covid-19 as the example news topic is because it raises a wide impact and concern, rather than events of personal interest.

Technically speaking, we built the prototype through the Django framework[1], Dialogflow API[2], Vue.js[3], and Neo4j graph database[4]. We first created a news database be crawling news about Covid-19 from three credible providers of Chinese news: `People's Daily online`[5], `RTHK`[6], and `WHO`[7]. The database contains in total 26,318 news starting from December 18, 2020 to February 4, 2021. We then used the Dialogflow API for realizing the conversational agent's user intent detection and entity extraction from their utterances, and general system response generation.

To further provide dedicated recommendations in this prototype, we leveraged a knowledge graph (CN-DBpedia[8]) to facilitate the retrieval of relevant news. This knowledge graph (KG) is automatically updated whenever a news is entered into the database. To be specific, once a news headline is received, we first call the CN-DBpedia API to identify whether the deadline's entity exists in CN-DBpedia or not. If it exists, the news' headline, url, and description will be stored as the entity's attributes in the graph, or a new entity is created if it does not exist. Subsequently, we carry out a 1-hop neighbor breadth-first search from the entity to add outgoing relations and nodes in our KG. In addition to existing relations in CN-DBpedia, we add a new link "appear in the same news" to the entities if they appear in the same news. By February 2021, we have constructed a news KG containing 13,665 entities and 18,013 relations related to the Covid-19 news event.

When users issue a request for recommendation, all the entities from the user's question will be extracted and mapped onto those in our KG. The system will then identify whether there are related entities linked by a relation (e.g., "appear in the same news") and retrieve all the relevant news from those located entities and return them as the recommendations. The interface by default displays six news (each contains the news' headline, url, short snippet, and picture) in response to the user's recommendation request (see Figure 1).

### 2.2 Participants

We recruited 10 participants (6 females and 4 males) to attend a face-to-face interview. They were asked to first interact with our prototype system based on those 22 sample questions (see Table 1). Then, a semi-structured interview was conducted to acquire their free thoughts and opinions, especially regarding the news recommendation by a conversational agent (called "chatbot" in the study for their easy understanding). Note that, by asking users to interact with a prototype in advance, we might be able to acquire their thoughtful and in-depth feedback based on their intuitive interaction experiences instead of random imagination.

All the participants (with ages ranging from 23 to 33) were from a public university to somewhat represent younger generation, given that younger generation is regarded as the major target audience of news chatbots [8, 10]. They are all Chinese, with higher frequency of accessing news from online websites/media (median = 4, rated on a 5-point Likert scale from "Never" to "Always") than from television (median = 2.5) and news papers/magazines (median = 1). Besides, they had certain familiarity with chatbots (median = 3, rated on a 5-point Likert scale from "Strongly disagree" to "Strongly agree" for the statement "I am familiar with chatbot technologies.") and recommender systems (median = 3.5, for the statement "I am

[1] https://www.djangoproject.com/
[2] https://dialogflow.cloud.google.com/
[3] https://vuejs.org/
[4] https://neo4j.com/
[5] http://www.people.com.cn/
[6] https://gbcode.rthk.hk/TuniS/news.rthk.hk/rthk/ch/
[7] https://www.who.int/zh/home/
[8] http://shuyantech.com/docuapi

**Table 1: A taxonomy of users' major recommendation-seeking and information-searching goals [26] with sample questions**

| Sub-goal | Criterion | Sample question (a Chinese version was used for our prototype implementation and experiment) |
|---|---|---|
| ***Recommendation-seeking goal*** | | |
| Objective | News genre | 1. *I want to know about the latest situation of Covid-19.* |
| | Language | 2. 你会说中文吗? *(Do you speak Chinese?)* |
| | Release date | 3. *I want to know some news stories on Covid-19 published on 12 Mar 2020.* |
| | Region | 4. *I want to know some news stories on Covid-19 in [the capital city of the country involved].* |
| | Deep features of news | 5. *I want to read an investigative report about the immigrants' life amid the Covid-19 pandemic.* |
| | People in news | 6. *I want to know how [the national leader] discusses the Covid-19.* |
| Subjective | Emotion | 13. *Are there any good news on Covid-19?* |
| | Quality | 14. *Are there any reliable news stories on Covid-19?* |
| | Relationship to another news (sports) | 15. *Are there any news stories on Covid-19 related to the Tokyo Olympics?* |
| | Relationship to another news (politics) | 16. *Are there any news stories on Covid-19 related to the 2020 US Election?* |
| | Relationship to another news (finance) | 17. *Are there any news stories on Covid-19 related to the Dow Jones Index?* |
| ***Information-searching goal*** | | |
| Informational | Advice | 7. *Tell me how to protect myself from Covid-19.* |
| | Undirected | 8. *Tell me about the quarantine policy in [the largest city of the country]* |
| | Directed-closed | 9. *What is the current quarantine policy in [the largest city of the country]?* |
| | Locate | 10. *Tell me where I can buy masks.* |
| | List | 11. *Show me the list of restaurants which are still open during the Covid-19* |
| | Directed-open | 12. *Why would the [the largest city of the country] impose a quarantine policy like that?* |
| Resource | Obtain | 18. *I want to get a table showing the numbers of confirmed cases in different countries all around the world.* |
| | Interact | 19. *Can I contact the editor of this news story?* |
| | Download | 20. *I want to download some podcast audio files.* |
| | Entertainment | 21. *I want to listen to some music now.* |
| Navigational | | 22. *I want to go to the webpage of the New York Times.* |

familiar with recommender technologies."). At the end of the study, each participant received around US$6.4 as the reward (the mean duration was around 1 hour).

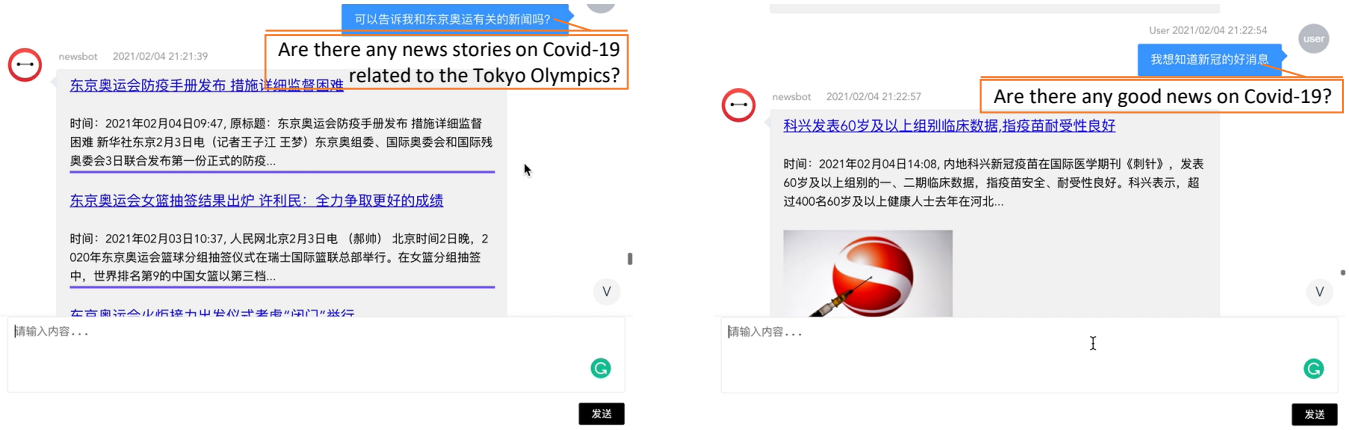
## 2.3 Results

Below we summarize users' responses to our open-ended questions into three categories (as agreed by two authors through independent coding first and then discussion): *in what conditions they may request/accept the news recommendation by a conversational agent*, *important features of the conversational news recommendation they expect*, and *opinions on the agent's preference elicitation strategy.*

*2.3.1 In what conditions users may request/accept the news recommendation by a conversational agent.* Two related questions were asked: "*Under what circumstances will you actively request news recommendation from a news chatbot?*" and "*Under what circumstances will you be inclined to accept the news recommendation by the chatbot?*" The former question was to know users' proactive recommendation-seeking intention, while the latter focused on their reactive response to the agent's recommendation.

From our participants' answers, we find that they may explicitly request for recommendations **when they feel it might be difficult to locate their interested information on their own**, e.g., by using search engine. They believe that the chatbot can be more competent to filter out irrelevant information and assist them in finding interesting news. For instance, one participant said that when he wants to know"*some specific news that is not easy to find through searching via search engine, and the most interesting domain of news that I want to check out on a daily basis.*" (P5). Another participant commented that "*when I just would like to know the results or status of something, but I don't want to use a search engine to look it up and sift through a lot of relevant information, I use a news chatbot.*" (P1). One user also believed that **a chatbot can help her analyze diverse viewpoints**, i.e., "*There are many opinions and standpoints about news on a certain topic and it is difficult to judge, so a chatbot is needed to assist in analysis.*" (P7).

Moreover, two participants tend to request news recommendation **when they have no specific goal**, i.e., "*When I want to get some news but do not have a clear goal.*" (P2) "*When I am not sure of what I want to see right now.*" (P4) "*I want to know the hot news today, but I don't have a goal or keywords. Under this situation, I prefer to actively ask chatbots for recommendations.*" (P7). Two participants




(a) (b)

**Figure 1: Snapshots of our prototype interface (implemented in Chinese because the participants of our study are native Chinese) in response to two user questions.**

will use the news chatbot for recommendations **during leisure time**, i.e., "*for entertainment in my leisure time.*" (P6) "*Relax when I am free.*" (P9).

As for their conditions of accepting a recommendation by the news chatbot, four participants described the situation when it is **relevant to their interests**. For example, "*The recommended content is close to my personal interest.*" (P5) "*When I look up the same kind of news many times, I hope it can recommend more relevant content to me.*" (P2). Two participants tend to **accept hot news**: "*[...] some hot news items, such as Trump's recent 'weird statements'.*" (P8) "*Eye catching topics in the headline*" (P5). Furthermore, a participant will **accept recommendations based on objective facts**, i.e., "*[I will be likely to accept] all kinds of sudden disasters, contest results, etc., recommended by the news robot. For news containing subjective comments, e,g., 'Why is the quarantine policy in Hong Kong crazy' or 'customs clearance policy in a certain place', I think the chatbot may give incorrect results or biased opinions.*" (P1). Two participants tend to accept if "*news cannot be obtained from other channels.*" (P7) or "*when I want to get information from multiple sources.*" (P9).

The users' free thoughts reveal that they may treat the news chatbot as a recommendation tool if it is able to *return not-easily located information, help analyze diverse viewpoints from multiple sources*, and *give some suggestions when they do not have clear targets.* On the other hand, the relevance of the recommendation to their interests is regarded important when they decide whether to accept or not, but non-personalized, hot news recommendations are also perceived useful by some users. Regarding the recommendation type, those news based on objective criteria are more favored than subjective ones, which is consistent with the previous survey's observation that users are more likely to ask *objective* questions when they use a news chatbot [26].

*2.3.2 Important features of the news recommendation by a conversational agent.* Users' alertness to the conversational recommendation's relevance is also reflected when we asked them to "*give some suggestions on our news chatbot.*" Six participants suggested improving the chatbot's **response relevance**, e.g., "*The accuracy of the answers needs to be improved*" because "*the chatbot came up with some irrelevant topics.*" (P4) "*Improve the relevance of recommendation results.*" (P5) "*The relevance and accuracy of responses can be better.*" (P7). Besides, one participant commented on the chatbot's **understandability**: "*I hope it can understand my question more accurately, and accurately answer.*" (P8); and three participants expressed the expectation for **efficiency**, e.g., "*The chatbot can answer a little faster.*" (P3) "*Reply as soon as possible.*" (P8).

As a follow-up question, we asked them "*the differences between news chatbots and traditional news websites or apps in terms of the way you receive news recommendation.*" They mostly mentioned the **conversational** speciality of the chatbot in this regard, e.g., "*News chatbots are interactive.*" (P1) "*Traditional websites used advertising images to present recommendations, whereas chatbots give recommendations while talking to users.*" (P4) "*The news chatbot gives users a more realistic scenario of chatting.*" (P3).

Moreover, three participants perceived the recommendation by a news chatbot **more personalized**, e.g., "*You ask news chatbots for the news you are interested in, but traditional news websites/apps provide general news which you may not have interest at all.*" (P5). News chatbots "*provide personalized news results based on users input and preferences*", while traditional news websites/apps "*usually display news data to users in unfiltered categories.*" (P1) "*The input to chatbots is more colloquial, so I feel that the feedback will be closer to what I want to know [...]*" (P10). Another participant perceived the news chatbot's recommendation **warmer**, i.e., "*Chatbots increase the interactivity. Users can have a sense of interaction with news chatbots. After news is sent, users will feel that they receive news from a virtual friend, which is warmer than viewing news in apps and traditional news websites alone.*" (P8). Two other participants highlighted the chatbot's advantages in respect of its **ease of use and effectiveness**, e.g., "*Traditional news apps collect a lot of information, but it takes time to find it. Chatting with the system makes it easier to find.*" (P9) "*News chatbots can provide users with*

*information more effectively than traditional news web pages that require users to search independently.*" (P6).

These opinions indicate that users are aware of the difference between news chatbots and traditional news websites/apps in terms of offering recommendations. The chatbot's conversational interface enables them to more easily obtain news information, so they expect that the recommendation provided in this setting should be more personalized (relevant) and the chatbot's response should be more efficient. We think this can be attributed to the chatbot's human-like appearance that makes users feel that it should be more anthropomorphic and responsive [16, 20].

*2.3.3 Opinions on the agent's preference elicitation strategy.* Because data sparsity is a typical phenomenon in news recommendation [12, 24], we are interested in knowing "*in what ways you would prefer that chatbots acquire your interests*", before the system might be able to generate some personalized recommendations. Our participants indicated both **implicit** and **explicit** ways. Specifically, seven participants favored the implicit way. For example, "*Recommending news to me based on what I have read and reading duration in the past.*" (P1) "*Viewing the searching history.*" (P4) "*Acquiring my history of viewed news, and learning from the questions I posed in the chat bot.*" (P5) "*Inferring from what I have asked.*" (P2). One participant said "*I don't want to be asked to fill in a questionnaire suddenly during the chat, because I'm not sure if I have time at the moment [...]*" (P10).

Four participants commented that the news chatbot can ask them to **choose the news categories of their interests**, e.g., "*The news chatbot can guide users to choose their favorite news category when they use it for the first time.*" (P1) "*The system lists a number of entries and then lets me choose a few that interest me.*" (P8). One participant preferred the chatbot to ask her directly, i.e., "*I expect news Chatbot can get my interests by directly asking.*" (P9).

The above results suggest that more users prefer the implicit, unobtrusive approach to inferring their interests based on their previous behavior, so that they might be able to immediately obtain recommendations when using the news chatbot. However, a few users are more inclined to tell the chatbot what they want on-site, which we think might be particularly beneficial to new users (without historical records) or those whose reading interests might often change. More studies are hence needed to examine how users' individual characteristics would affect their preferred way of interacting with the news conversational agent for disclosing their interests.

## 3 DISCUSSION AND CONCLUSION

This work aims to understand how users would comment on conversational recommender agents in the news domain. We concretely conducted a pilot study that first asked participants to experience a prototype system that was implemented centered around a taxonomy covering major recommendation-seeking and information-searching goals from related literature. Based on their interaction experiences, a semi-structured interview was subsequently conducted to know their attitudes towards the news recommendation by a conversational agent. The interview results reveal three interesting observations.

1). Personalized vs. non-personalized recommendations have long been argued in the literature about news recommender systems [6, 12, 22, 24]. The former has been favored by some researchers because it may allow users to quickly access news matching to their interests [17, 24], but others think it could lead to "information cocoons" issue and limit users to the set of topics/opinions they are familiar with [3, 6, 13]. They suggest to increase the degree of non-personalization in news recommendation generation, so as to help users access broader and diverse types of news. Our interview results show that users expect to receive more personalized news recommendation when they interact with a conversational agent, which may be because its human-like appearance makes users be inclined to have more personal conversation with it. They hope to freely talk with the chatbot by telling what they want.

2). Our participants suggest some important features of recommendations by a news conversational agent. For instance, they expect that the agent could integrate news information from multiple sources (instead of representing a single news provider) to allow them to easily locate information and save their own efforts in searching. They also hope that the chatbot could assist them in analyzing diverse viewpoints in respect of a certain topic. In their opinion, the chatbot could not only be conversational, but also be capable of dealing with different types of requests in consideration of their current status and goal.

3). As for the agent's preference elicitation strategy (to acquire individual users' interests), our participants expressed different opinions. Some prefer to receive recommendations right away from the news chatbot, while some would like to have more control over the preference elicitation process and are willing to answer the chatbot's questions before it gives recommendations. We think both approaches might be applicable, but considering that in general readers' preferences for news topics might be subject to change (e.g., being triggered by certain events) [12, 19], we suggest a hybrid approach would be more effective. That is, the chatbot might first establish an initial user model based on her previous reading histories (if available) and then refine it through on-site conversation with the user for obtaining her current interests. In this way, the agent might be able to generate more accurate news recommendation [24].

However, there are several limitations of this work. *Firstly*, the taxonomy adopted to build our prototype system for user interaction [11, 21, 26] might overlook some goals specific to the news domain (e.g., knowing different viewpoints about a certain event) [10]. Moreover, all the sample questions are limited to Covid-19, while other categories of topics could be considered such as sports, technology, arts, etc., given that the user's preference for them might be different from that for the Covid-19 pandemic. In the future, we plan to enrich the taxonomy by means of collecting real human-human dialogues in different news categories and annotating them in terms of reader intents and goals. We believe eventually this taxonomy could be useful for guiding researchers on how to frame user tasks for designing or evaluating their own news conversational agents. *Secondly*, all the participants are ethnically Chinese and young adults, which may limit the generalizability of our observations to people in other population groups. More studies should be needed to validate the results among people of diverse backgrounds. *Thirdly*, the news conversational agent that we built is a

simple prototype system for the purpose of stimulating users to have some intuitive interaction experiences. We will continue to improve its recommendation quality according to users' comments.

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