Study on the Factors Influencing the Use of Intelligent Voice Assistant

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Abstract

The development speed of intelligent voice technology will break through people's imagination, and artificial intelligence voice customer service is developing to the direction of intelligent, anthropomorphic, simple and operational mature technology and perfect service. This paper uses interview method to understand the influencing factors of intelligent voice assistant, and verifies the effect of these factors by questionnaire. Analyzing the influence of usefulness, entertainment and humanity on the use willingness of intelligent voice customer service, and conducting relevant research can not only improve users' feelings of use, To improve people's willingness to use intelligent voice assistants，but also provide reference suggestions for their further development.

Keywords

Intelligent voice assistant; Usefulness; Recreational; Anthropomorphism; Use intention.

1. INTRODUCTION

In recent years, artificial intelligence has developed rapidly and has received more and more attention. In 2017, China's artificial intelligence ushered in a real new era, and intelligent voice, as an important branch of artificial intelligence, will become the next outlet.[1] Among them, "intelligent voice assistant", an important industrial application in voice AI, has also become a major application field of artificial intelligence. Intelligent voice assistant is a product [2] that can complete the tasks arranged by users, has certain attributes, can complete listening, speaking, reading and writing, and be in situations to achieve the answer. Under the development of the current era, with the affordable consumption equipment and rapid wireless network surge, human-computer dialogue voice interaction is inevitable, intelligent assistant will quietly penetrate into all aspects of our life, whether at home or outside, they are promoting the real practical tools, and change the way we interact with the machine. The technology behind the voice assistant consists of three major blocks: speech recognition, semantic understanding, and speech synthesis. Speech recognition converts the user's instructions into text text, while semantic understanding is based on text text to understand the user's intention, make relevant responses and operations, and output the reply text feedback to the user. Finally, the voice synthesis then converts the reply text into voice output. At present, the intelligent voice assistant in the industry is usually used in both consumer products and professional-level industry applications. The selling point of intelligent voice assistant is that they want to free their hands through voice control, and the accuracy of intelligent voice assistant on voice semantic recognition has become the most important factor for users to choose and use it. In addition to these reasons, I think there are several reasons for people to adopt intelligent voice assistant, one is the usefulness of intelligent voice assistant, the second is entertainment, the

third is the human nature. Based on the technical perspective, this paper understands the technical characteristics and factors affecting the use of intelligent voice assistant, seeks for the current factors that affect the use of intelligent voice customer service, and applies them to practice, which will make a significant contribution to the popularization and improvement of intelligent voice customer service system.

2. QUALITATIVE ANALYSIS AND HYPOTHESIS ARE PRESENTED

2.1. Qualitative analysis

To investigate the influence of the influence of intelligent voice assistant research, we interviewed a total of five objects, a 62 male and a 33-year-old man, two 21-year-old men and a 21-year-old woman, interview they all mentioned now the intelligent voice assistant is not perfect, may appear "artificial retarded", don't understand our instructions, sometimes call not intelligent voice assistant, sometimes too sensitive. Some respondents feel that the intelligent voice assistant is very mechanized, without the emotion of the characters, he is very like a machine in the pale to give an answer to what you want to say. Intelligence is not as good as they expected. The respondents hope that the intelligent voice assistant can be more intelligent to face the needs of each owner, so that they can do some different answers. Some respondents think that these intelligent voice assistants are now very well coordinated with other products. It is a whole control achieved through the Internet, which is very convenient for people's lives now. Effectiveness, stability and convenience are now on the rise and can be done better. Young respondents may pursue more about its entertainment, convenience, and humanity, while older interviewers may pursue more about its practicality. Through interviews with them, I think the intelligent level of intelligent voice assistant is one of the main reasons that hinder consumers from using AI products. I think enterprises should strengthen algorithms and research and development investment to provide consumers with trustworthy smart products. Such as an interviewer, before he used millet phone small love classmates, once during his meeting, little love confused was awakened, it suddenly called, it will affect the progress of work and the meeting smoothly, so in this respect respondents feel also need to perfect, because the voice assistant is too sensitive, he felt need a whole voice recognition function, intelligent voice assistant will only identify the host voice to do instructions, and will not recognize the voice of others, this aspect to make some adjustments. Such as our sixty-old uncle, uncle is older, now these intelligent devices, he only used car intelligent voice assistant to navigation, he usually not pinyin only handwritten, car navigation using voice control it faster and faster, drive distance at ordinary times, he will let car intelligent voice assistant to play music to relieve fatigue, he does not pay much attention to intelligent voice assistant its voice, emotion and intelligence of these aspects, uncle think as long as the intelligent voice assistant to understand his instructions, more practical. Most respondents said that the intelligent voice assistant does not produce emotions like friends, and cannot communicate and discuss like friends. The reason for using it is to free the hands and search powerful. So, I think usefulness, entertainment, and anthropomorphic nature are important factors affecting the use willingness of intelligent voice assistants.

2.2. Assume to put forward

Multiple interviewees mentioned intelligent voice assistant use a lot, such as make a phone call, don't have to look for contacts, can wake up voice assistant, let him help us find the contact and call, and need to operate mobile phone and hands are wet, we can wake up mobile phone intelligent voice assistant, let him according to my instructions. Therefore, this study raises the hypothesis that usefulness positively affects the willingness to use of intelligent voice assistants.

Hypothesis 1: Usefulness positively affects the willingness to use intelligent voice assistants

Some interviewees proposed that the intelligent voice assistant has a strong entertainment, for example, when bored, can wake up the intelligent voice assistant, let them tell jokes, let the boring life add a bit of fun. Most interviewers said that intelligent voice assistant is more willing to use voice assistant. Therefore, this study proposes the hypothesis that entertainment positively affects the use willingness of intelligent voice assistants.

Hypothesis 2: Entertainment positively affects the willingness to use intelligent voice assistants

Interview object mentioned on the market intelligent voice assistant to human nature is not very perfect, the voice is mechanized, reaction is not flexible enough, not more intelligent to face some of each master demand for it, without their own thoughts and feelings, most interviewees think intelligent voice assistant in behavior or mental state is not similar to human level, if the intelligent voice assistant personification degree higher they are more willing to use. Therefore, this study proposes the hypothesis that quasi-human nature positively affects the use willingness of intelligent voice assistants.

Hypothesis 3: Proposed humanization positively affects the willingness to use intelligent voice assistants

Through the above research and investigation, reasonable assumptions are proposed, and a theoretical model is established in Figure 1:
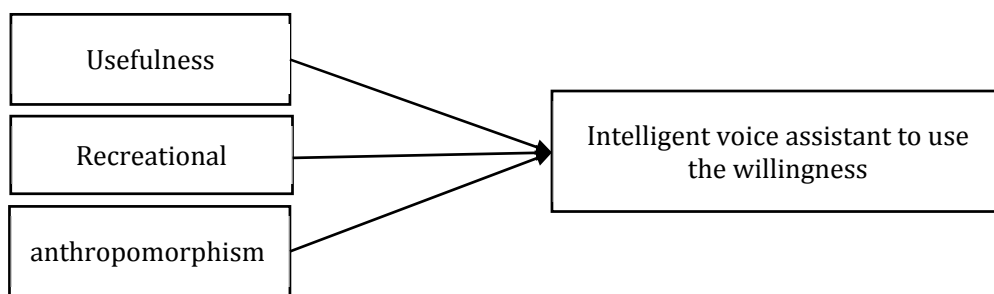

Figure 1. The theoretical model

3. RESEARCH METHOD

3.1. research approach

Through the theoretical analysis of the literature reading method to build the theoretical basis, the collated literature is reviewed, in the literature Select the variables and comb out the relationship. Relevant populations were interviewed, hypotheses were proposed, and model construction was conducted through the literature and discussions with teachers. Design questionnaire, pre-survey was conducted, and the questionnaire and distribution form were modified combined with feedback. Data were collected by the questionnaire survey method. The data were cleaned and analyzed with spss software to draw the final conclusions. Figure 2.
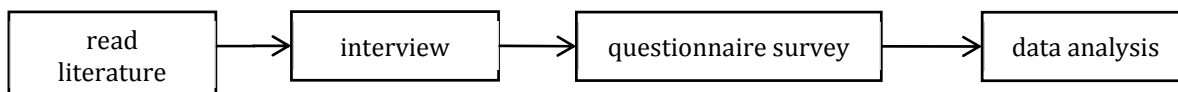

Figure 2. Research approach

3.2. research method

Literature reading method and theoretical analysis method Based on the research problem of the article, first find the intelligent voice, the elderly, family support and other keywords related literature, Combing out the definition, dimensions, influencing factors, and measurement methods of each concept. At the same time, based on the characteristics of the intelligent voice assistant combined with the platform, the shortcomings of the current research are clarified, and the specific application of the current theory in this research is analyzed to provide a theoretical basis for the future.

Questionnaire survey method Design the questionnaire based on the preliminary research and the reference to other relevant studies. The questionnaire survey method should be mainly used The conceptual measurement process of usefulness on willingness to use influence model, entertainment on willingness to use influence model, quasi-humanity on willingness to use influence model.

3.3. Measurement scale

Through previous interviews and literature reading, the following scales were designed, as shown in Table 1.

Table 1. Scale

Constructive read	Conception	Measurement scale	Source
Perceived usefulness	The extent that users believe that using intelligent voice assistants can help them accomplish their target tasks.	I think the virtual assistant is useful to me.	Fernandes & Oliveira Fernandes & Oliveira (2021)
		I think the virtual assistant can help me with many things.	
Perceive entertaining / hedonic motivation	Individuals want to be fun or happy by using an intelligent voice assistant.	I have fun interacting with AI.	Gursoy et al. (2019)
		Interacting with AI devices is fun.	
		Interacting with AI devices is entertaining.	
		Interaction with AI is enjoyable.	
		The actual process of interacting would be pleasant.	
anthropomorphism	Intelligent voice assistants have similar levels to humans in behavior or mental state.	AI devices have a mind of their own.	Gursoy et al. (2019)
		AI devices have consciousness.	
		AI devices have their own free will.	
		AI devices will experience emotions.	
Use intention	How much do users are willing to use intelligent voice assistants in the future.	I am willing to receive AI device services.	Gursoy et al. (2019)
		I will feel happy to interact with AI devices.	
		I am likely to interact with AI devices.	

3.4. pre-survey

Collect and sort out the journal literature data related to the subject, and use the interview method to deeply understand the influencing factors of users on the use of intelligent voice assistant. Through analysis and research, discuss with teachers around the assumptions, and finally determine the investigation through four aspects: usefulness, entertainment, human nature and use intention. A total of 72 questionnaires were issued in the pre-survey, and 72 questionnaires were collected. In the process of questionnaire distribution, a lot of feedback was received. According to the pre-survey, we modified the questionnaire, improved the questionnaire, and finally generated the formal questionnaire.

4. DATA ANALYSIS

The formal questionnaire has been issued and recovered, 265 valid questionnaires have been recovered, the questionnaire recovery and information sorting, data entry has been completed, the collected data is cleaned and analyzed through spss software to check whether the question items are reasonable, test whether the data are effective and credible, and analyze how the independent variables affect the dependent variables.

4.1. Descriptive statistical analysis

Table 2. Descriptive statistical analysis

variable	Question item	frequency	percentage	Effective percentage	accumulative perception
sex	male	113	42.6	42.6	42.6
	female	152	57.4	57.4	100.0
age	Age under 20 years	14	5.3	5.3	5.3
	20-29 Years old	104	39.2	39.2	44.5
	30-39 Years old	28	10.6	10.6	55.1
	40-49 Years old	18	6.8	6.8	61.9
	50-59 Years old	26	9.8	9.8	71.7
	60-69 Years old	61	23.0	23.0	94.7
	70-79 Years old	13	4.9	4.9	99.6
	80-89 Years old	1	.4	.4	100.0
income	Less than 50,000 yuan	58	21.9	21.9	21.9
	500,000-100,000 yuan	85	32.1	32.1	54.0
	100,000-200,000 yuan	65	24.5	24.5	78.5
	200,000-300,000 yuan	24	9.1	9.1	87.5
	300,000-400,000 yuan	15	5.7	5.7	93.2
	400,000-600,000 yuan	10	3.8	3.8	97.0
	More than 600,000 yuan	8	3.0	3.0	100.0
degree of education	Junior high school and below	36	13.6	13.6	13.6
	High school / technical school / technical secondary school (including current students)	38	14.3	14.3	27.9
	College college (including students)	41	15.5	15.5	43.4
	College undergraduate (including students)	143	54.0	54.0	97.4
	Graduate student or above (including current students)	7	2.6	2.6	100.0

The questionnaire investigated the use of intelligent voice assistant for the elderly, and 265 questionnaires were received, and 265 were valid questionnaires were received. From the details of the respondent demographics in Table 2, for gender, 152 respondents (57.4%) were female and 113 respondents (42.6%) were male. In terms of age, 14 (5.3%) under 20,104 (39.2%) aged 20-29,28 aged 30-39 (10.6%), 40-49 (60.8%), 26 aged 50-59 (9.8%), 61 aged 60-69 (23.0%), 13 aged 70-79 (4.9%), and 1 aged 80-89 (0.4%). In terms of income background, there are 58 (21.9%) less than 50,000 yuan, 85 (32.1%), 100,000-20 0,000 yuan, 65 (24,000 yuan, 24 (9.1%), 200,000,000 yuan, 30-400,000 yuan, 400,000.10 (3.8%), and 8 (600,000 yuan (3.0%). In terms of educational background, 36 students (13.6%) graduated from junior high school or below, 38 students (14.3%) graduated from high school / technical school / technical secondary school, 41 junior college (15.5%), 143 students (54.0%), and 7 graduate students or above (2.6%)

4.2. Factor analysis

The exploratory factor analysis of the variables was used to select and eliminate the obviously unreasonable items. Through the factor analysis results in Table 3, it is known that the load coefficient of one factor is greater than 0.5, and the load coefficient of the other two factors is less than 0.5, so there are no heavy load items, indicating that there are no unreasonable items in the questionnaire.

Table 3. Results of the factor analysis

	usefulness	Recreational	Anthropomorphism	Use intention
Usefulness 1	.194	.837	.267	.232
Usefulness 2	.216	.855	.211	.263
Usefulness 3	.079	.678	.342	.476
Usefulness 4	.159	.680	.217	.520
Recreational 1	.245	.252	.822	.244
Recreational2	.170	.351	.807	.258
Recreational3	.250	.191	.811	.287
Anthropomorphism1	.804	.094	.301	.249
Anthropomorphism2	.898	.122	.152	.163
Anthropomorphism3	.925	.116	.113	-.001
Anthropomorphism4	.876	.195	.127	.020
Use intention1	.092	.426	.225	.779
Use intention2	.277	.334	.373	.650
Use intention3	.061	.269	.287	.821

4.3. Reliability analysis

The Cronbach's Alpha coefficient was calculated for each variable greater than 0.7 indicating good reliability of the measurement scale.

Through the reliability analysis results of Table 4, the Cronbach's Alpha value of usefulness is 0.926 greater than 0.7, and the Cronbach's Alpha value after deleting each item is less than 0.926, so it can be retained. The entertaining Cronbach's Alpha value of 0.913 is greater than 0.7, and the deleted Cronbach's Alpha value is less than 0.913, so it can be retained. The Cronbach 'sAlpha value of 0.930 is greater than 0.7, and the Cronbach' sAlpha value is less than 0.930, so all the data can be retained. The desired Cronbach 'sAlpha value of 0.874 is greater than 0.7, and the respective deleted Cronbach' sAlpha value is less than 0.874, and all data can be retained.

Table 4. Results of the reliability analysis

variable	Question item	The Cronbach's Alpha value after deleting either item	The Cronbach's Alpha value
usefulness	usefulness1	0.907	0.926
	usefulness2	0.893	
	usefulness3	0.907	
	usefulness4	0.909	
Recreational	Recreational1	0.870	0.913
	Recreational2	0.864	
	Recreational3	0.892	
Anthropomorphism	Anthropomorphism1	0.923	0.930
	Anthropomorphism2	0.898	
	Anthropomorphism3	0.899	
	Anthropomorphism4	0.915	
Use intention	Use intention1	0.796	0.874
	Use intention2	0.860	
	Use intention3	0.814	

4.4. analysis of validity

When the KMO coefficient is greater than 0.8; Bartlett's spherical degree test for significance is Sig. <0.05, the scale authenticity is good.

Through the validity analysis results of Table 5, we show that the KMO is 0.913 greater than 0.8, and the sig. value is 0.000 less than 0.05, which meets the requirements and shows that the scale has good discriminatory validity.

Table 5. The validity analysis results

KMO Number of sampling suitability quantities		.913
Bartlett Sphicity Test	Approximate chi square	3367.627
	free degree	91
	Significance	.000

Factor analysis :No indicator has loadings (in bold) with lower values than their cross-loadings (Chin, 1998).As shown in Table 3, the factor load (bold) values of usefulness, Recreational, Anthropomorphism, and willingness to use themselves are greater than their cross-factor load and meet the requirements, so the scale has good discriminatory validity.

4.5. Regression analysis

The p-value < 0.05, which is significantly related. The sig. value < 0.05, the relationship is significant, β value is positive, the independent variable has a positive effect on the dependent variable, and vice versa, it has a negative effect. As shown in Table 6, the sig. value of usefulness < 0.001, the value of entertainment sig.<0.001, and the value of sig. are less than 0.05, indicating that usefulness and entertainment have a significant impact on the willingness to use. The β values for usefulness and entertainment are 0.588 and 0.292, respectively, and the β values are positive. Therefore, both usefulness and entertainment positively affect the willingness to use intelligent voice assistants, and the anthropomorphic sig. value is 0.934, and the sig. value is greater than 0.05, indicating that the impact of anthropomorphism on the willingness to use intelligent voice assistants is not significant.

Table 6. Results of the regression analysis

model	Non-standardized coefficients		Standard coefficient	t	Sig.
	B	standard error	β		
(constant)	.338	.175		1.925	.055
usefulness	.588	.048	.588	12.162	<.001
Recreationa	.292	.050	.292	5.860	<.001
Anthropomorphism	.003	.041	.003	.082	.934
sex	-.197	.073	-.098	-2.693	.008
age	-.037	.022	-.070	-1.659	.098
degree of education	-.028	.037	-.032	-.766	.444
The R2 / Adjust the R2	0.670/0.663				
Model F values	87.452				
Model significance	0.000				

5. SUMMARY

The findings suggest that hypotheses 1 and 2 were validated by investigation and analysis. Therefore, the usefulness and entertainment of intelligent voice assistant are important factors that people use intelligent voice assistant. Usefulness and entertainment have a positive and significant impact on the willingness to use of intelligent voice assistant, while the human nature has no significant impact in the data analysis. We believe that the insignificant effect of human nature may be that the influence of human nature on the use intention may be completely mediated by other factors. To validate the effects of other mediation effects, follow-up studies are needed to continue exploration on the basis of this study.

The results provide practical implications on how to improve people's willingness to use intelligent voice assistants. First, the results suggest that usefulness and entertainment have a significant positive impact on improving the willingness to use intelligent voice assistants. Therefore, in order to improve people's willingness to use intelligent voice assistant, we can improve the intelligent level of intelligent voice assistant, I think enterprises should strengthen the investment in algorithm and research and development, to provide consumers with reliable intelligent products. At present, the mobile voice assistant is far from reaching the point of perfect, there are a lot of improvement, so for the current voice assistant, the most important is to strengthen the ability of free communication with users, and not limited to a single command dialogue, on the other hand also need to enhance the ability of voice assistant learning, in the process of users constantly use to more understand the user's behavior. At the stage when the smart phones have gradually become the first entrance for the users to connect to the smart devices, the intelligent voice assistant is bound to become the most convenient channel for the users to connect with the smart devices.

ACKNOWLEDGMENTS

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APPENDIX A SURVEY QUESTIONNAIRE

Dear interviewees:

Howdy！ We are a researcher from Beijing Materials College. I hope you can help us to complete the questionnaire survey. The information obtained is completely confidential and is used for scientific research only. Thank you deeply for your support!

Note: Intelligent voice assistant is an information technology product with virtual assistant and voice command function.

essential information

1. Please think in your mind of an intelligent voice assistant that you have contacted. Which type of intelligent voice assistant do you think of is below?

A. Smart speaker (such as: Tmall elf, Xiaoya speaker, Xiaoya speaker, Xiaodu speaker, Xiaomi speaker) B. Mobile voice assistant (such as: siri, Xiaoyi, Small love, Xiao Ou, Jovi) C. Smart home products (such as: smart massage device, smart rice cooker) D. the above are not used

2. Your gender

A. male   B. female

3. Your level of education

A. Junior high school and below B. High school / technical school / technical secondary school (including students) C. College college (including students) D. Undergraduate (including students) E. Graduate students and above (including students)

4. Your family's disposable annual income

A. Less than 50,000 yuan B.50,000-100,000 yuan C.100,000-200,000 yuan D.200-300,000 yuan E.300,000-400,000 yuan F.400,000-600,000 yuan G. Over RMB 600,000 yuan

Note: Please fill in the questionnaire according to your actual use of the intelligent voice assistant that you have just selected. You only need to judge the following statements. There is no right or wrong point in your choice, so please answer according to the actual situation.

Perceived usefulness / outcome expectations

5. I think the intelligent voice assistant is very useful for me

6. I think the intelligent voice assistant can help me in many ways

7. Using an intelligent voice assistant will improve my efficiency in many ways (such as faster information and easier control of appliances)

8. Using an intelligent voice assistant will improve the quality of my life

perceived enjoyment

9. I think it is interesting to interact with intelligent voice assistants

10. I think the interaction with the intelligent voice assistant is enjoyable

11. I think it's fun to interact with intelligent voice assistants

anthropomorphism

12. I think the intelligent voice assistant has its own want to send it

13. I think the intelligent voice assistant is thoughtful

14. I think the intelligent voice assistant has its own free will

15. I think the intelligent voice assistant is emotional

Use intention

16. I am willing to use the intelligent voice assistant

17. I am happy to interact with the intelligent voice assistant

18. I will probably use an intelligent voice assistant

APPENDIX B INTERVIEW OUTLINE

1. Do you know about and use smart speakers, mobile smart voice assistants, and smart voice assistants embedded in devices?(Smart speaker: such as Tmall Spirit, Xiaomi smart speaker, Huawei smart speaker, Xiaodu smart speaker; smart voice assistant: such as "siri" on Apple phone, "Xiaoyi" on Huawei phone, "little love classmate" on Xiaomi phone, "y o y y o", etc.; embedded equipment: voice-controlled sweeping robot, intelligent massage helmet, smart remote control, smart TV, etc.)

2. How do you think the intelligent voice assistant on these devices is connected, controlled, and interacting with other products (such as desk lamps, ceiling lights, sweeping robots, and smart home appliances)? How about the effectiveness, stability, and convenience? How will this affect your willingness to use these smart voice assistants? Can you illustrate the good and bad experiences, and the impact on your willingness to use them?

3. How close do you think these intelligent voice assistants are in terms of sound, emotion, intelligence, etc.? What does it affect your willingness to use it? Can you introduce one or more specific examples?

4. Do you think these smart voice assistants are a bit like your friends? Do you feel more close to yourself? How does this feeling affect your willingness to use your intelligent voice assistants? Can you give it an example?

5. What do you think of the sense of social presence (face to face) using these intelligent voice assistants? How does this feeling affect your willingness to use your intelligent voice assistants? Can you give it an example?

6. Do you think using these smart voice assistants is fun? Or how entertaining? How does this feeling affect your willingness to use your intelligent voice assistants? Can you give it an example?

7. What do you think these voice assistants do? Or is it dispensable? What were the main functions of the smart speakers when you started using these smart voice assistants? Will these useful features prompt you to use them?

8. Is there any other reason why you use this intelligent voice assistant?

9. Age, gender, educational background, professional background, occupation, work unit of the respondents.