

# Looking at delayed responses of a chatbot and what the effect is on the perceived humanness

Milo Treanor (6587403)

Linus Erren (7550006)

Roemer Schwaanhuysen (6613101)

Nikolas Stavrou (0906581)

Renate Burema (6502180)

October 12, 2023



# Utrecht University

# Abstract

## Introduction

**Why is your research question and approach to it relevant?** chatbots that are perceived to be more human-like seem to have a positive effect on consumer interaction according to prior research (Lu et al., 2022; Rapp, Curti, & Boldi, 2021). To create a chatbot that offers positive user interaction it is relevant to know how to improve the human-likeness of our system. We will use a questionnaire to analyze whether there is a significant difference in the perceived humanness of a chatbot with delayed reactions to the human user and a chatbot without delayed reactions. We adapted a questionnaire previously used by (Jakobsen, 2021).

## Methods

### Participants

**Who are you going to test and how many?** The participants for testing our chatbot will be students between the ages of 18-30. And we will have around 50 participants participating in the user study.

### Experimental design

**Experimental design: How do you want to test your research question? (within/between, number of trials etc.)** We will test our research question with a within-subject design. Meaning that each participant will be exposed to both conditions. Condition one is our chatbot where there are no delayed responses to the user inputs and condition two is our chatbot where there are delayed responses. The participants will have a conversation with the chatbot in each condition 5 times, thus the number of trials in total is 10. The participant will see either condition 1 and then 2, or first condition one and then condition 2. Therefore, the participants will randomly be divided into two groups of the same size. All participants of the same group will see the same order of conditions.

### Materials/ Measures

**Which materials do you want to use to assess data?** We will conduct the experiment on a laptop with a 14"inch screen, the keyboard and mouse of the laptop itself. The dependent variable is the perceived human-likeness which we will measure with a questionnaire that was already validated in a slightly different version in a previous work (Jakobsen, 2021). The questionnaire is depicted in Appendix B. The independent variable is whether or not there is a delay. The data will be assessed in python, likely using a ????. We will use the package ??? to be able to do the statistical test to evaluate whether the delay of the chatbot responses has an significant effect on the perceived humanness.

### Task/ Procedure

**Task/procedure: Which tasks do participants need to do?** We will give each participant an identical set of scenarios for which they will interact with our chatbot to get a restaurant recommendation. We have implemented a chatbot for recommending restaurants to the user which we want to evaluate in this study. Therefore, the scenarios will be a task to get a suitable restaurant recommendation from the chatbot with given preferences. An example of a task is: "Ask the chatbot for a restaurant suggestion. Your preferences are that you want the restaurant in the north part of the town, you want the restaurant to be in the moderate price range and you want Italian food. If no there is no such restaurant, search for an Italian restaurant with moderate prices in another part of town." As we stated before, each participant will chat with the chatbot 10 times in total, 5 times for

condition 1 where there is no delay and 5 times for condition 2 where there is a delay. Or the other way around first condition 2 then condition 1. Thus the participant will get 10 tasks, similar to the example above. All the scenarios can be found in appendix A. Afterward we will ask the participants to fill in a two questionnaires, one for each chatbot. The questionnaire is the same for both chatbots and can be found in appendix B.

## **Results**

## **Discussion**

## References

- Jakobsen, A. (2021). *Humanlike customer service chatbots: The effect of humanness on user experience and user behavior* (Unpublished master's thesis).
- Lu, L., McDonald, C., Kelleher, T., Lee, S., Chung, Y. J., Mueller, S., . . . Yue, C. A. (2022). Measuring consumer-perceived humanness of online organizational agents. *Computers in Human Behavior*, *128*, 107092.
- Rapp, A., Curti, L., & Boldi, A. (2021). The human side of human-chatbot interaction: A systematic literature review of ten years of research on text-based chatbots. *International Journal of Human-Computer Studies*, *151*, 102630.

## A Scenarios

	Description
Scenario 1	Ask the chatbot for a restaurant suggestion. Your preferences are that you want the restaurant in the north part of the town, you want the restaurant to be in the moderate price range and you want Italian food. If no there is no such restaurant, search for an Italian restaurant with moderate prices in another part of town
Scenario 2	Ask the chatbot for a restaurant suggestion. Your preferences are that you want the restaurant to be in the south part of town, you want the restaurant to be in the moderate price range and you want European food. If no such restaurant is available, search for an European restaurant in the south part of town in another price range.
Scenario 3	Ask the chatbot for a restaurant suggestion. Your preferences are that you want the restaurant to be in the centre of town, the restaurant to be in the moderate price range and they need to serve Turkish food. Make sure that for the suggested restaurant you get the phone number.
Scenario 4	Ask the chatbot for a restaurant suggestion. Your preferences are that you want the restaurant to be in the east part of town, in the expensive price range en serving Spanish food. Make sure that for the suggested restaurant you get the phone number and postcode.
Scenario 5	Ask the chatbot for a restaurant suggestion. Your preferences are that you want the restaurant to be in the west part of town, in the moderate price range en serving British food. Make sure that for the suggested restaurant you get the phone number, address and postcode.
Scenario 6	Ask the chatbot for a restaurant suggestion. Your only preference is that you want the restaurant to be in the south part of town, for price range and kitchen type you have no preference. For those preferences you can fill in: "don't care". Furthermore, you want the restaurant to be romantic.
Scenario 7	Ask the chatbot for a restaurant suggestion. Your only preferences is that you want the restaurant to be in the centre of town, you want the restaurant to be cheap food and for kitchen type you have no preference. For this preference you can fill in: "don't care". Furthermore, you want the restaurant to be touristic. Make sure that for the suggested restaurant you get the postcode.
Scenario 8	Ask the chatbot for a restaurant suggestion. Your only preferences is that you want the restaurant to be in the centre of town, you want the restaurant to be cheap food and for kitchen type you have no preference. For this preference you can fill in: "don't care". Furthermore, you want the restaurant to not have assigned seats.
Scenario 9	Ask the chatbot for a restaurant suggestion. Your only preference is that you want the restaurant to serve seafood. For the price range and area for the restaurant you have no preference. For these preferences you can fill in: "don't care". Furthermore, you want the restaurant to be able to take children with you. Make sure that for the suggested restaurant you get the phone number and address.
Scenario 10	Ask the chatbot for a restaurant suggestion. Your only preference is that you want the restaurant to serve Italian food. For the price range and area for the restaurant you have no preference. For these preferences you can fill in: "don't care". Make sure that for the suggested restaurant you get the phone number and postcode.

Table 1: The 10 scenarios which a participant encounters during the experiment

## B Questionnaire

# Feedback Questionnaire

Please answer the following questions to help us with the evaluation of the chatbot.  
When answering the questions go with the answer that immediately comes to your mind.  
There are no right or wrong answers, only your honest opinion matters.

Please specify your personal data

How old are you?

Your answer

What is your gender?

- ☐ Female
- ☐ Male
- ☐ Other

What is your highest qualification?

- ☐ High School
- ☐ Bachelor
- ☐ Master
- ☐ PhD
- ☐ Other

In your opinion, how well describe the following words the chatbot for restaurant recommendations?

Likeable

	1	2	3	4	5	6	7	8	9	10	
Describes very poorly	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Describes very well

Sociable

	1	2	3	4	5	6	7	8	9	10	
Describes very poorly	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Describes very well

Friendly

	1	2	3	4	5	6	7	8	9	10	
Describes very poorly	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Describes very well

Personal

	1	2	3	4	5	6	7	8	9	10	
Describes very poorly	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Describes very well

While you were interacting with the chatbot ...

... how much did you feel as if it was an intelligent being?

	1	2	3	4	5	6	7	8	9	10	
Not at all	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Extremely

... how much did you feel as if it was communicating with you?

	1	2	3	4	5	6	7	8	9	10	
Not at all	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Extremely

... how much attention did you pay it?

	1	2	3	4	5	6	7	8	9	10	
Not at all	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Extremely

... how much did you feel involved with it?

	1	2	3	4	5	6	7	8	9	10	
Not at all	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Extremely



Considering the word-pairs below, how would you describe the chatbot for restaurant recommendations?

	1	2	3	4	5	6	7	8	9	10	
Machine-like	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Human-like

	1	2	3	4	5	6	7	8	9	10	
Unnatural	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Natural

	1	2	3	4	5	6	7	8	9	10	
Artificial	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Lifelike

	1	2	3	4	5	6	7	8	9	10	
Insensitive	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Sensitive

... and how would you describe the chatbot for restaurant recommendations using these word pairs?

	1	2	3	4	5	6	7	
Simple	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Complicated

	1	2	3	4	5	6	7	
Practical	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Impractical

	1	2	3	4	5	6	7	
Cumbersome	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Straightforward

1 2 3 4 5 6 7

Predictable ☐ ☐ ☐ ☐ ☐ ☐ ☐ Unpredictable

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1 2 3 4 5 6 7

Confusing ☐ ☐ ☐ ☐ ☐ ☐ ☐ Clearly Structured

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1 2 3 4 5 6 7

Unruly ☐ ☐ ☐ ☐ ☐ ☐ ☐ Manageable

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1 2 3 4 5 6 7

Inventive ☐ ☐ ☐ ☐ ☐ ☐ ☐ Conventional

## Your Feedback

Finally, we would love to hear your opinion on the chatbot for restaurant recommendations in your own words.

Your answer \_\_\_\_\_