

Subjective Speech Can Be Useful for Persuasive Virtual Humans

Executing Distinctiveness to Increase the Virtual Humans' Trustworthiness and Persuasion Effect

Tetsuya Matsui
Seikei university
Musashino-shi, Tokyo
t-matsui@st.seikei.ac.jp

Seiji Yamada
National Institute of Informatics, The Graduate University
for Advanced Studies (SOKENDAI)
Chiyoda-ku, Tokyo
seiji@nii.ac.jp

ABSTRACT

In this work, we developed virtual humans (VH) designed to persuade users. We introduce the notion of distinctiveness of topics and define two kinds of persuasion strategies: "objective persuasion", which aims to persuade with only objective sentences and no expression, and "subjective persuasion", which aims to persuade with only subjective sentences and smiles and gestures. We performed experiments in which a VH recommended trips under two conditions. In condition 1, the VH recommended a topic that she preferred using subjective persuasion and another topic using objective persuasion. In condition 2, she recommended a topic that she preferred using objective persuasion and another topic using subjective persuasion. Results showed the VH in condition 1 increased the buying motivation of participants.

CCS CONCEPTS

• **Human-centered computing** → **HCI theory, concepts, and models**;

KEYWORDS

Virtual human, Virtual agent, Persuasion technology, Anthropomorphic agent, Trust, Product recommendation virtual agent (PRVA)

ACM Reference Format:

Tetsuya Matsui and Seiji Yamada. 2018. Subjective Speech Can Be Useful for Persuasive Virtual Humans: Executing Distinctiveness to Increase the Virtual Humans' Trustworthiness and Persuasion Effect. In *6th International Conference on Human-Agent Interaction (HAI '18), December 15–18, 2018, Southampton, United Kingdom*, Jennifer B. Sartor, Theo D'Hondt, and Wolfgang De Meuter (Eds.). ACM, New York, NY, USA, 2 pages. <https://doi.org/10.1145/3284432.3287178>

1 INTRODUCTION

One of the applications of virtual humans (VHs), which are anthropomorphic virtual agents, is to persuade people. For example, the product recommendation virtual agent (PRVA) is a virtual agent that persuades users to purchase products [5]. In this paper, we propose a method for increasing the persuasion effect of VHs.

We introduce the notion of the distinctiveness of topics, which comes from prior research in social psychology. Here, we define

distinctiveness as the difference in persuasion strategy for a given topic. Kelley's covariation model suggested that distinctiveness is the main factor of attribution [2][3]. Bohner et al. showed that speakers who responded positively every time regardless of the topic or their own principles were less likely to be trusted [1]. This finding demonstrates that distinctive speech has a bigger effect than non-distinctive speech, and distinctiveness can be perceived when the manner of speaking is changed for different topics. In this research, we aimed to equip VHs with distinctiveness so as to increase their trustworthiness and motivate users to buy.

We express distinctiveness as the difference in persuasion strategy, namely, subjective persuasion and objective persuasion. Our hypothesis is as follows: "PRVAs that make recommendations subjectively when talking about topics they prefer are more strongly trusted and increase users' motivation to buy more compared with other PRVAs". To verify this hypothesis, we defined two kinds of strategy and performed experiments using both.

2 EXPERIMENTAL DESIGN

To express distinctiveness, we defined two kinds of persuasion strategy: "objective persuasion" and "subjective persuasion." Objective persuasion means persuasion that is constructed with only objective sentences, for example, "This restaurant opened in 1922." Subjective persuasion means persuasion that is constructed with only normative propositions, i.e., propositions that are composed of subjective sentences, for example, "This meal is very delicious." We also specified the facial expressions and gestures that go along with each strategy. For only subjective persuasion, VHs smile and use hand gestures to express positive emotion. Prior works have shown that VHs and robots can effectively express their emotions to users by means of hand gestures [8][4][6].

The experiments were performed under two conditions. In all experiments, participants watched movies in which a PRVA recommends a trip to Sapporo, a popular Japanese sightseeing city. After watching the movies, participants answered questionnaires. The PRVA recommended sightseeing spots first and then local delicacies second. Before starting recommendations, the PRVA gave a self-introduction that included the phrase "I like to eat local delicacies on trips." This is the PRVA's declaration of a preference. We constructed all movies with MMDAgent, a toolkit for constructing virtual agent conversation systems, executed by the Nagoya Institute of Technology¹. Figure 1 shows an example of the process flow of one trial in the experiment and the virtual human we used.

In condition 1, the "discriminable condition," the PRVA recommended a sightseeing spot by using objective persuasion and local delicacies by using subjective persuasion. In condition 2, the

¹<http://www.mmdagent.jp/>

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HAI '18, December 15–18, 2018, Southampton, United Kingdom

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ACM ISBN 978-1-4503-5953-5/18/12.

<https://doi.org/10.1145/3284432.3287178>

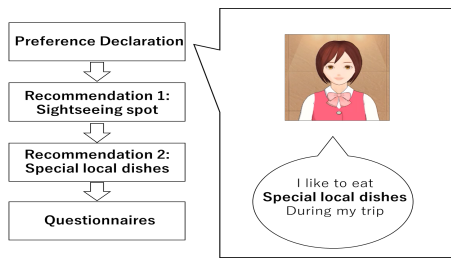


Figure 1: Process flow and VH used in the experiments.

“reverse-discriminable condition,” the PRVA recommended the sightseeing spot by using subjective persuasion and local delicacies by using objective persuasion. We used this condition to confirm whether only executing distinctiveness was ineffective, i.e., that consistency in declaring a preference is also important. We hypothesized that the recommendation effect (buying motivation) on participants in condition 1 would be higher than in condition 2.

The questionnaires that participants were asked to fill out after watching the movies included the Interpersonal Solidarity Scale (ISS) and one additional question. The ISS is a scale that measures personal trust toward a particular person [7]. It contains 20 questions that participants were asked to answer on a seven-point Likert scale. The additional question was “Do you want to go on a trip to Sapporo, like the PRVA recommended?” We used this question to calculate the “recommendation effect.” The participants answered this question on a seven-point Likert scale, the same as the ISS. We also asked them two additional questions about the movies to ensure that they had watched the whole thing. Participants who answered with the same number five times in a row were excluded as noise. We also excluded participants who did not answer the questions about completing the movies correctly.

For condition 1, we recruited 84 participants, 62 of whom remained after noise exclusion. There were 34 males and 28 females ranging in age from 22 to 71 years for an average of 42.6 (SD = 9.9). For condition 2, we recruited 130 participants, 64 of whom remained after noise exclusion. There were 36 males and 28 females ranging in age from 24 to 61 years for an average of 41.8 (SD = 8.5). All participants were recruited from Yahoo Crowd Sourcing² and paid 50 yen (about 45 US cents) as a reward. All trials were conducted on the Web.

3 RESULT AND DISCUSSION

Fig. 1 shows the average of the ISS and recommendation effect scores. We conducted a t-test between the two conditions. There were no significant differences in ISS [$t(124) = 1.56, p = 0.121$], and there were significant differences in recommendation effect score ($p < 0.05$) [$t(124) = 2.19, p = 0.030$].

In Fig. 2 there are no significant differences in ISS. This means that being trusted is not always important to increase the recommendation effect. Also, there were significant differences in recommendation effect. The results suggest that distinctiveness that consists of declaring a preference can increase the recommendation effect. The participants in condition 1 were more likely to accept

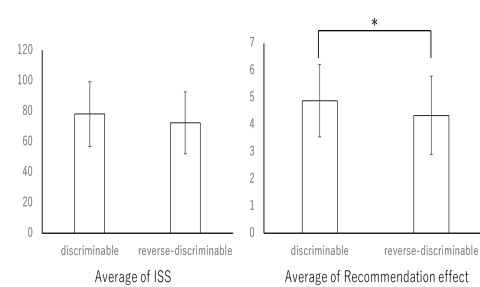


Figure 2

Average of ISS and recommendation effect scores of each condition

the recommendations about trips than in condition 2. This result is in good agreement with our hypothesis.

4 CONCLUSION

We proposed a method for increasing the persuasion effect of VHs, specifically, PRVAs. In this method, the distinctiveness of topics is an important notion. We defined distinctiveness as the difference in persuasion strategy and defined two kinds of persuasion: “objective persuasion” and “subjective persuasion.” To verify this hypothesis, we performed experiments under two conditions. In condition 1, the PRVA used subjective persuasion when she spoke about a topic that she preferred and used objective persuasion when she spoke about other things. In condition 2, the PRVA used objective persuasion when she spoke about a topic that she preferred and used subjective persuasion when she spoke about other things. The results showed that the participants in condition 1 had increased motivation to buy compared with condition 2. This supports our hypothesis.

ACKNOWLEDGMENTS

This research was partially supported by JSPS KAKENHI “Cognitive Interaction Design” (No. 32626118005).

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²<https://crowdsourcing.yahoo.co.jp/>