Intelligent speaker is watching you: alleviation of L2 learners' social anxiety

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Abstract. This study investigates the effectiveness of an Artificial Intelligence (AI) speaker as a device used for interactions in a foreign language (L2), and a tracking eye installed on the speaker to reduce L2 anxiety. L2 anxiety is an urgent issue since the anxiety derived from a fear of being judged, being negatively evaluated, or being rejected by others is hindering active L2 use. Our study hypothesizes that the question–response functions of the AI speakers would encourage L2 learners to input and output a considerable amount of L2 without the feeling of anxiety toward the speakers. We then asked eight Japanese undergraduates to conduct daily L2 interactions with the speakers in their homes for one month. The findings from pre-and post-listening tests, questionnaire surveys, and interviews revealed that intelligence speakers – Google Home (GH) – could enhance the learners' L2 motivations, gave them positive impressions, and helped eradicate their anxiety toward L2 interactions.

Keywords: foreign language anxiety, L2 learners' anxiety, intelligence speaker, human-robot interaction.

1.   Introduction

The difference between what learners can do and what they want to do as L2 users (Horwitz, Horwitz, & Cope, 1986) causes anxiety. Japanese learners of English as L2 are more likely to suffer from social anxiety (Krieg et al., 2019). Such anxiety is caused by the disparity between the 'true self' and 'limited self' (Kráľová, 2016), fear of negative evaluation (Bailey, 1983), and underestimation of the learners'

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actual language proficiency (Bailey, Daley, & Onwuegbuzie, 1999). For this reason, the learners avoid foreign oral communication, and fewer chances of L2 utterance hinder their progress, thus resulting in a vicious cycle. In this study, we focus on the presence of a low human-like appearance as an L2 communication partner. People who suffer from higher social anxiety tend to prefer communication with a robot rather than with a stranger (Nomura, Kanda, Suzuki, & Yamada, 2019). Intending to reduce social anxiety and enhance their L2 competence, we conducted an L2 learning trial with AI speaker, GH. Not much research is available on the capability of AI in education (Sundar, 2008). Their function has not reached the level to converse with interlocutors naturally; thus, the speakers can interact with them by responding to their commands.

2. Adding human-likeness to GH

Our study investigates the human-like appearance control of AI speakers. This idea is based on the gradual change of the human-likeness overcoming social anxiety. To test our concept, we developed the human-like eye robot *Akagachi* (Figure 1).

Figure 1. *Akagachi* on GH
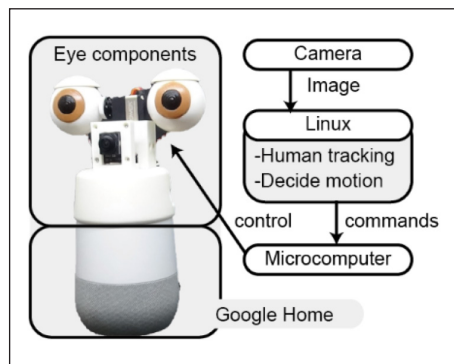
2.1. Hardware

Akagachi has a wide-angle camera for recognizing and for continuously gazing into people's eyes. Three servo motors activate the eyeballs. A 170-degree wide-angle USB camera was used to detect movement. Besides, a robot operating system, and a microcontroller control the electronic components. Each part is 3D-printed.

2.2. Software

Figure 2 presents the view of face tracking. First, the face area is clipped with the OpenCV[3] blue square). Second, Dlib[4] detects the eyes (pink area). Third, the point between the eyes is calculated (blue dot). Finally, the direction is converted to the degrees of the three servo motors.

Figure 2. Face tracking by *Akagachi*
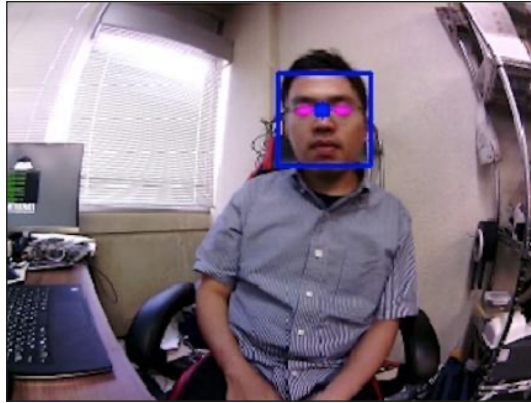
Akagachi can simulate the human-like eye movement using a simple control system. The latest source code and 3D models are opened with GitHub[5].

3. Practice procedures

Eight undergraduates (native speakers of Japanese) were instructed to use GH in their homes and to interact with it in English for one month. This activity was conducted to examine (1) whether self-learning with an intelligent speaker could improve the L2 oral skills of the participants, (2) whether this activity could encourage the participants experiencing social anxiety to conduct L2 verbal interactions, and (3) whether the eye robot *Akagachi* could differentiate the attitudes of the learners. After introducing how to use and the several commands to respond to them in English, we then performed the following activities to evaluate the impact of GH on L2 oral proficiency:

3. Open Source Computer Vision
4. http://dlib.net/
5. https://github.com/hayashik/akagachi_eye_robot_hardware

- conducted a pre-listening test which consists of 18 questions (short conversation) from the Test of English for International Communication (TOEIC) and English interview;

- asked the participants to interact with the GH in English for 10 minutes per day for one month;

- asked the participants to do a weekly report (they visited our office and reported the activities they did and their feelings during the interaction) and to demonstrate their actions at the office using the GH with *Akagachi*; and

- conducted a post-listening test (the same as the first test) and English interview (with questionnaire survey about social anxiety and motivation, and follow-up interview in Japanese).

4. Findings

Figure 3 presents the test score of the pre- and post-listening test. The test score was analyzed using Wilcoxon's signed-rank nonparametric test. Although five participants were able to obtain better scores in the post-test than in the pre-test, no significant difference was observed ($p=.57, >.05$).

Figure 3. TOEIC test score
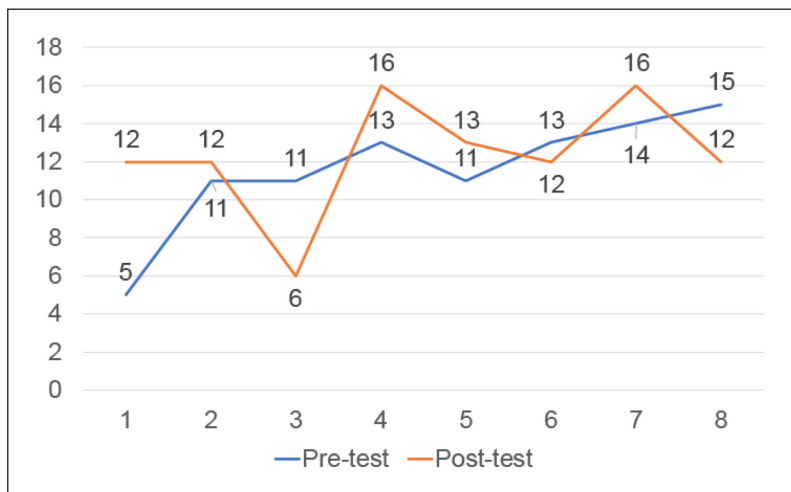
Yet, the participants seemed to gain a sense of achievement. In the interview, which was conducted after performing the activities, one student answered that his English skill was improved, even though his test score declined. Besides, some students reported that they achieved some degree of confidence, saying, "I could be exposed to English at ease, even when I was lying on my bed", "I was glad to find that I could make myself understood in English. I have never got that feeling", and "I got used to listening to English a fortnight later".

Figure 4 presents the result of social anxiety using two-dimensional model scales (Horii & Ogawa, 1997). The scores of the participants are low, indicating that their social anxiety is high, which hinders their interaction with other people.

Figure 4.   Social anxiety results
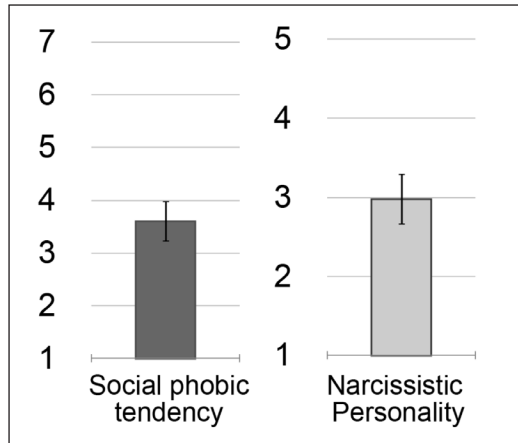
However, after completing the GH activity, which lasted one month, the five-point Likert scale questionnaire indicates that the participants can positively interact with GH. Figure 5 also shows that their overall attitude toward the interaction with GH is positive. The results suggest that they favorably interact with GH during the period, despite their high social anxiety. The following statement from a student presents their positive attitudes: "I could interact with GH rather comfortably, although I got nervous when talking with others".

Figure 6 presents the correlations of the words stated by the participants during the follow-up interview. As can be seen from it, there is a strong correlation between [関心 (interest)] and [持つ (have)], indicating their keen interest in GH or the L2 interactions with GH, which is also reflected in the questionnaire results.
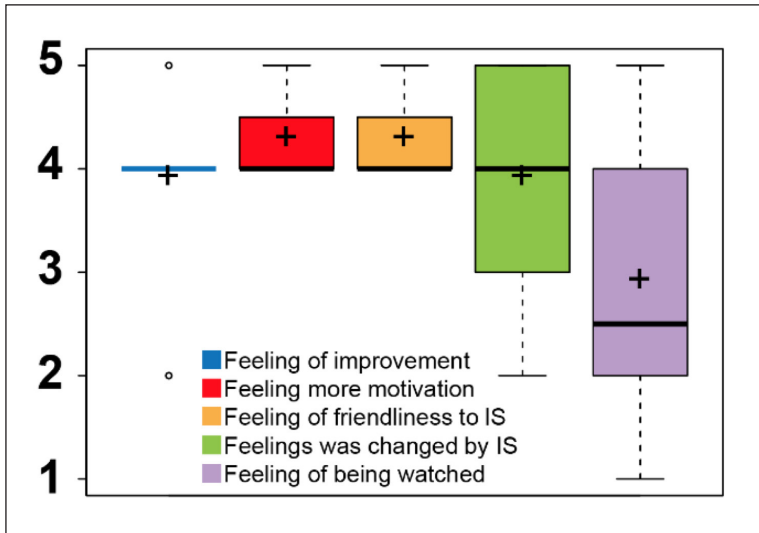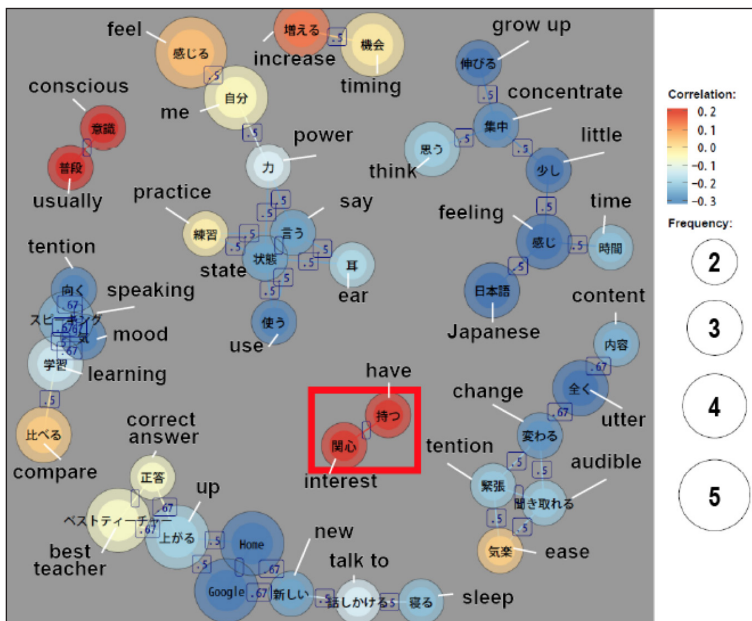
Figure 5.   Questioners results

Figure 6.   Co-occurrence network

5.   Discussion and conclusion

This study showed that GH reduces L2 anxiety and improves foreign language education to undergraduates who have high social anxiety. Although the results of the TOEIC test could not show significant improvement, the students felt improvement in their L2 oral skills and motivation. From the follow-up interview, GH might succeed in motivating their keen interests. The findings of our preliminary study indicate the possibility of L2 learning with AI speakers, which would become popular due to the COVID-19 pandemic.

In this study, we could not evaluate the efficiency of *Akagachi*, although we provided the participants with the opportunity to use GH with *Akagachi* once a week. Thus, the participants did not obtain some special feelings toward *Akagachi*. For example, one student said that the Japanese were unlikely to look someone in the eye when talking. Conversely, some of them had a sense of intimacy and regarded GH as a living thing. Another student reported, "I felt sorry and sad when I pushed the reset button to return the GH". This statement indicates the possibility of *Akagachi* making an intelligent speaker more human-like, leading to a more effective L2 learning assistant. We think that it will be necessary for *Akagachi* to be used to practice regular eye-to-eye L2 communication.

We will compare the existing intelligent speakers and collect more data by using intelligent speakers or apps. *Akagachi* will be evaluated as an L2 communication partner and updated, such as eye movement quality. In this challenging time, intelligent speakers will contribute to L2 learning.

6.   Acknowledgments

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