12th International Conference of the Immersive Learning Research Network
Selected Academic papers for the iLRN Proceedings
DOI: https://doi.org/10.56198/S7USI8PMX

The Role of Avatar Appearance in Shaping EFL Learners' Willingness to Communicate

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Abstract. This study examined how avatar appearance influences Japanese EFL learners' willingness to communicate (WTC) and state communicative self-confidence, including anxiety and self-perceived communicative competence, drawing on the Proteus effect—the tendency for individuals to align their behaviors and attitudes with their avatars' characteristics. Thirty-one Japanese university students participated in English communication tasks in VR using three avatar ethnicity conditions: baseline, Asian, and White. The baseline avatar was a neutral silhouette used for comparison. The Asian avatar was designed to represent a Japanese speaker, while the White avatar was intended to reflect a commonly idealized image of a native English speaker based on representations found in language education contexts. Results showed that avatar appearance did not significantly affect WTC or self-perceived communicative competence. However, participants reported significantly lower state anxiety and higher state communicative self-confidence when embodying the White avatar compared to the baseline condition. Linear mixed-effects analyses further indicated that communicative outcomes were largely influenced by stable individual differences, while embodiment components were differentially associated with anxiety and learners' self-confidence and perceived competence depending on avatar condition. These findings highlight conditional avatar influences on EFL learners' affective experiences and communicative self-evaluations in immersive VR contexts.

Keywords: Willingness to Communicate, Virtual Reality, Proteus Effect, Avatar.

1 Introduction

The importance of second language (L2) oral communication skills for L2 learners is widely recognized. Yashima et al. [1] emphasized that the ultimate goal of L2 and foreign language learning is to foster communication and mutual understanding across cultures. MacIntyre et al. [2] underscored the significance of communicative goals by proposing a conceptual model of willingness to communicate (WTC). According to the authors, WTC is conceptualized as a situational construct with both transient and enduring influences and is a predictor of L2 communication frequency, shaped by multiple variables. Among these, anxiety and self-perceived communicative competence play a central role in influencing learners' tendency to use the L2 [3]. Previous studies have found that low levels of anxiety and sufficient levels of self-perceived communicative competence are strong predictors of WTC [3, 4].

WTC can be enhanced through effective instructional methods that incorporate immersive virtual environments. Virtual reality (VR) is defined as "computer technologies that can generate perceptual feelings as well as actual feelings from virtually created cyberspace" [5:142], which allows users to immerse themselves in virtual environments [6]. Ebadi and Ebadijalal [7] compared a group of EFL learners who used Google Expeditions VR with a control group and found that both WTC and oral proficiency significantly increased from the initial to the final presentation in an experimental group. Yudintseva [8] reported that participants experienced lower levels of state anxiety after a high-immersion VR learning experience.

VR technologies are generally divided into two categories based on their level of immersion: low-immersion VR (LiVR) and high-immersion VR (HiVR). LiVR environments include interactive and extensive functionalities

but do not appear realistic to the senses, typically involving a two-dimensional monitor [9]. In contrast, HiVR environments create a sense of physical presence for users using head-mounted displays (HMDs) [9].

One research area leveraging HiVR is the Proteus effect, which was first introduced by Yee and Bailenson [10], and extensive research on the phenomenon has since been conducted [11]. For example, Yee and Bailenson [10] reported that participants with taller avatars behaved more confidently than those with shorter avatars. Kilteni et al. [12] observed that participants with casually dressed, dark-skinned avatars showed increased drumming movements compared to those with avatars in formal suits. A meta-analysis of 46 studies found the Proteus effect to be a robust phenomenon (r = 0.24), which is relatively large compared to other media effects (e.g., video games), making it an important factor to consider in future media effects research [13].

Rooted in self-perception theory, the Proteus effect posits that users' perception of their avatars as extensions of the self leads them to adopt attitudes and behaviors aligned with the avatars' characteristics [13]. According to Kilteni et al. [14], the sense of embodiment describes the phenomenon in which the characteristics of another body are processed as if they were inherent to one's own biological body. Building on this, recent studies suggest that embodiment-specific components—unique to the experience of embodying an avatar—rather than effects from passive viewing, such as the subjective feeling of avatar body ownership, play a key role in the Proteus effect [15]. As such, the sense of embodiment is a distinguishing feature that supports the Proteus effect as a unique psychological mechanism in virtual environments [16]. Therefore, exploring the relationship between WTC and embodiment may provide important insights into how the Proteus effect influences WTC.

Although recent trends in Proteus effect studies have been to manipulate avatar traits (e.g., height, gender, race, and weight) as independent variables and to examine cognitive and affective outcomes as dependent variables [16], no research has yet explored how avatar appearance affects EFL learners' WTC. Therefore, the purpose of this study is to investigate how the Proteus effect shapes learners' self-perceptions and, in turn, their WTC. This research is guided by the following research questions:

RQ1: To what extent do differences in avatar appearance affect EFL learners' WTC?

RQ2: To what extent do differences in avatar appearance influence the relationship between WTC and embodiment?

2 Methods

2.1 Participants

The participants were 31 Japanese university students (21 female and 10 male) who voluntarily participated through an announcement on the university website. They were all recruited from a Japanese university located in the Kanto area, with a required TOEIC score 500 or above to ensure sufficient speaking ability for participating in the experiment's communication tasks. One participant scored 480; however, this participant was included in the study due to the individual's active voluntary participation in extracurricular English communication activities. Each participant received JPY 2,000 as compensation. The mean age was M = 20.39 (SD = 1.15), and the mean TOEIC score was M = 645.48 (SD = 104.84). The mean score of the participants' prior VR experience was M = 1.94 (SD = 1.12), indicating that most participants had limited VR experience. The experimental protocol was reviewed and approved by the Ethics Committee of Reitaku University.

2.2 Avatars and VR Environment

Ruecker and Ives [17] reported that language school recruitment websites in East and Southeast Asia commonly depict ideal English teachers as young, white, enthusiastic native English speakers, a belief referred to as native speakerism, the established belief that native speaker teachers represent "Western culture" and embody the ideals of English [17]. Based on this finding, the present study implemented three avatar conditions: Asian, White, and a baseline avatar. The Asian avatar was designed to represent a Japanese speaker, whereas the White avatar represented a prototypical native English speaker based on common visual representations in language learning contexts. The baseline avatar used a human silhouette and served as a reference condition, following the design used by Kilteni et al. [12].

To create the Asian and White ethnicity avatars, HeyGen, an AI-based image generation tool, was used to produce realistic male and female images, using prompts designed to create standard university student images for each ethnicity. Since AI generates slightly different images even with the same prompt, the procedure was repeated three times, producing three images per gender for both Asian and White ethnicities. Then, 16 to 17 students from the same university who did not participate in the experiment were asked to rate how well each image represented a Japanese or White male/female native English speaker on the scale of ten. The AI-generated

images (Asian female [*M* = 7.31, 6.13, 4.56]; Asian male [*M* = 6.35, 5.35, 4.53]; White female [*M* = 7.59, 7.29, 7.18]; White male [*M* = 7.94, 7.29, 7.18]) with the highest average scores were selected.

Based on the selected images, four 3D avatars (Asian female/male and White female/male) were created using VRoid, which allows customization of body and facial features. Both preset and manual editing functions were used to enhance realism. The completed avatars were then imported into Unity for experimental use. The VR environment was also developed in Unity (version 6000.0.30f1) and consisted of a room with brown walls and floor, a mirror, a chair, and a desk. The chair and desk were positioned in front of the mirror to allow participants to perceive the avatar as their own reflection. Finally, the avatars and VR environment were uploaded to VRChat, a social VR platform, where the experiment was conducted.

2.3 Speaking Task

During the experiments, participants responded in English to pre-recorded prompts. Three speaking task topics were designed, each consisting of six prompts, resulting in a total of 18 prompts. These English prompts were presented using prerecorded AI-generated voices for each avatar condition. The topics—food, university life, and hobbies—were selected for their familiarity to university students. The English prompts were checked with a word-level checker to ensure that all words used were at the L1 level (the lowest level) of the New JACET List of Basic Words (New JACET8000), thereby reducing participants' cognitive load during listening and speaking. This list, a revised version of the original JACET8000, was developed by the Japan Association of College English Teachers (JACET) and is intended as an educational word list for Japanese university-level English learners [18].

2.4 Instruments

All questionnaires were translated into Japanese.

Demographic Data. Participants reported their gender, age, TOEIC score, and prior VR experience. Prior VR experience was measured on a 5-point Likert scale ranging from 1 (never experienced) to 5 (often experienced).

Willingness to Communicate (WTC). WTC was measured using the eight-item scale adapted by Yashima [19], a shortened version of the original WTC scale revised for the Japanese EFL context. The Japanese translation by Watanabe [20] was used. Items assessed participants' willingness to communicate in various English-speaking situations on a 7-point Likert scale (1 = never, 7 = always). In addition, state communicative self-confidence was measured using the scale developed by Reinders and Wattana [3], which consists of two subscales—state anxiety and self-perceived communicative competence—each comprising five items. Responses were recorded on a 7-point Likert scale (1 = strongly disagree, 7 = strongly agree). To suit the present study, references to a "computer game setting" were replaced with "VR environment."

Embodiment Questionnaire. Sense of embodiment was measured based on the framework proposed by Kilteni et al. [14], which includes self-location, agency, and body ownership. The revised embodiment questionnaire developed by Peck and Gonzalez-Franco [21], consisting of four components (Appearance, Response, Ownership, and Multisensory), was adopted. Items were rated on a 7-point Likert scale (1 = strongly disagree, 7 = strongly agree). Three items related to tactile feedback were excluded due to the VR setup, resulting in 13 items used for analysis. In addition to component scores, an Overall Embodiment score was calculated by averaging the mean scores of the four subscales.

Avatar Appearance Confirmation Check. Participants' perception of avatar ethnicity was assessed using a single item: "Did the virtual body you saw in the VR environment feel closer to a native English speaker or to a Japanese?" Responses were recorded on a 5-point scale ranging from completely closer to a Japanese to completely closer to a native English speaker. This item was included in the post-surveys.

2.5 Procedure

To investigate whether avatar appearance can affect EFL learners' perceptions, this study employed a within-subjects design using three avatar ethnicity conditions (baseline, Asian, and White), balancing across communication tasks on three different topics. Participants embodied avatars matching their gender across different avatar conditions and task topics.

Before putting on the HMD (Meta Quest 3), participants were informed about the purpose of the study, the experimental procedure, and that the data collected in this experiment would not be used for any purpose other than this study. They were also told that sufficient care would be taken to ensure anonymity. Then they were briefly instructed on how to use the HMD.

The experimental procedure was divided into two parts: Phase 1 and Phase 2. In Phase 1, all participants experienced the baseline avatar. This avatar was used to familiarize participants with the avatar and the VR environment and served as a reference for comparison with the White and Asian avatar conditions. After the introduction, participants put on the HMD and entered the virtual environment, where their avatar was reflected in the mirror in front of them. They were asked to move their heads and hands for about 60 seconds to familiarize themselves with the avatar. The avatar's head, hands, and mouth moved simultaneously when the participants moved and spoke. Subsequently, participants responded in English to six pre-recorded prompts, delivered in English in an AI-generated voice through a speaker positioned outside the HMD. After responding to the prompts, they removed the HMD and completed the post-survey on their smartphones.

In Phase 2, participants embodied either the White or Asian avatar that matched their gender, followed by the other avatar. The order was counterbalanced to minimize order effects and potential bias. The topics for the speaking tasks were also counterbalanced across the three avatar conditions (baseline, White, and Asian). After completing the speaking task under each avatar condition, participants completed the post-survey on their smartphones outside the HMD. The procedure for the White and Asian avatar conditions was identical to that used for the baseline condition described above.

2.6 Data Analysis

Some items were reverse scored prior to analysis. To address RQ1, one-way repeated-measures MANOVA and follow-up repeated-measures ANOVAs were conducted to examine the effect of avatar conditions (baseline, White, and Asian) as the within-subjects independent variable using SPSS (Version 29.0.2). Dependent variables were WTC, state anxiety, self-perceived communicative competence, and state communicative self-confidence.

For RQ2, four linear mixed-effects models (LMEMs) were run for the same variables as RQ1. Fixed effects included the four components of embodiment (Response, Ownership, Multisensory, and Appearance), avatar conditions (reference = baseline), and the interaction between the two. Prior to the main analyses, multicollinearity was assessed using variance inflation factors (VIFs) calculated from models without interaction terms. The results indicated severe multicollinearity when the Overall Embodiment score was included alongside its component variables (VIF > 10); therefore, Overall Embodiment was excluded from subsequent analyses. The final models included the four embodiment components and their interactions with avatar conditions, with participant ID specified as a random intercept to account for repeated measures. All LMEMs were conducted using the *lme4* package in R.

3 Results

3.1 Participants' Characteristics

Participants' responses regarding avatar ethnicity indicated that 87% of participants selected "completely closer to a Japanese" or "somewhat closer to a Japanese" when embodying the Asian avatar, whereas 71% of participants selected "completely closer to a native English speaker" or "somewhat closer to a native English speaker" when embodying the White avatar. These results suggest that participants perceived the intended ethnic differences between avatars.

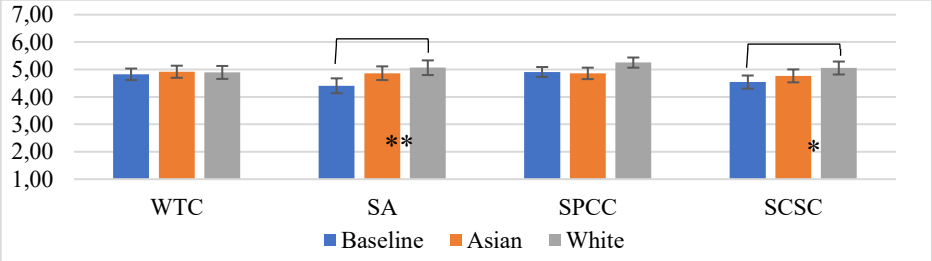
3.2 Effect of Avatar Appearance on WTC

Internal consistency was assessed using Cronbach's α. The self-perceived communicative competence subscale initially showed low reliability (α = .62); therefore, one item with a low corrected item–total correlation was removed. The resulting Cronbach's α values were .83 for WTC, .83 for state anxiety, .74 for self-perceived communicative competence, and .89 for state communicative self-confidence, indicating acceptable internal consistency. All subsequent analyses were conducted using the revised subscale.

A one-way repeated-measures MANOVA was conducted to examine the effect of avatar appearance (baseline, Asian, White) on the four dependent variables: WTC, state anxiety, self-perceived communicative competence, and state communicative self-confidence (Fig. 1). The multivariate effect of avatar was statistically significant, Pillai's Trace = .392**,** $F(6, 25) = 2.69$, $p = .037$, partial $\eta^2 = .39$. To investigate the source of the multivariate effect, follow-up repeated-measures ANOVAs were conducted for each dependent variable. No significant differences

were found across avatar conditions for WTC, $F(2, 60) = 0.42$, $p = .66$, partial $\eta^2 = .014$, nor self-perceived communicative competence, $F(2, 60) = 1.61$, $p = .21$, partial $\eta^2 = .051$. However, significant effects were observed for state anxiety, $F(2, 60) = 5.22$, $p = .008$, partial $\eta^2 = .15$, and state communicative self-confidence, $F(2, 60) = 3.17$, $p = .049$, partial $\eta^2 = .095$.

Bonferroni-adjusted pairwise comparisons revealed that state anxiety was significantly lower in the baseline avatar condition than in the White avatar condition (mean difference = −0.66, $p = .002$). Because higher scores indicate lower anxiety, this result suggests higher anxiety in the baseline condition. No significant differences were found between the baseline and Asian avatar conditions or between the White and Asian avatar conditions (ps > .16). Similarly, for state communicative self-confidence, participants reported significantly higher confidence in the White avatar condition compared with the baseline avatar condition (mean difference = −0.51, $p = .034$). All other pairwise comparisons were not statistically significant (ps > .56).



Note. WTC = willingness to communicate; SA = state anxiety; SPCC = self-perceived communicative competence; SCSC = state communicative self-confidence. Error bars show standard errors. *$p < .05$, **$p < .01$.

Fig. 1. Mean scores for WTC, SA, SPCC, and SCSC across avatar conditions.

3.3 Effect of Embodiment on WTC Across Different Avatar Appearance

The internal consistency of the four components of embodiment was assessed using Cronbach's α. The Cronbach's α values were .91 for Appearance, .84 for Response, .78 for Ownership, and .74 for Multisensory, indicating acceptable internal consistency.

For RQ2, LMEMs examined the effects of avatar conditions, embodiment components, and their interactions on WTC, state anxiety, self-perceived communicative competence, and state communicative self-confidence. For WTC, no significant main effects of avatar condition or embodiment components were found. However, significant interaction effects were observed between the Asian avatar condition and Response ($\beta = -0.84$, $p = .002$), between the White avatar condition and Ownership ($\beta = 0.38$, $p = .033$), and between the Asian avatar condition and Appearance ($\beta = 0.72$, $p = .010$). The model showed a high conditional R^2 (.90) and a low marginal R^2 (.04). For state anxiety, no significant main effects were detected. A significant interaction emerged between the White avatar condition and Multisensory perception ($\beta = -0.58$, $p = .035$). Interactions between the Asian avatar condition and Appearance ($\beta = 1.04$, $p = .059$), and between the White avatar condition and Ownership ($\beta = 0.64$, $p = .077$), approached significance. The conditional and marginal R^2 values were .72 and .12, respectively. For self-perceived communicative competence, no significant main effects were found. The interaction between the White avatar condition and Multisensory perception approached significance ($\beta = -0.58$, $p = .051$), as did the interaction between the Asian avatar condition and Appearance ($\beta = 1.07$, $p = .073$). The conditional R^2 was .58, and the marginal R^2 was .13. For state communicative self-confidence, no significant main effects were observed. A significant interaction was found between the White avatar condition and Multisensory perception ($\beta = -0.58$, $p = .026$). Interactions between the Asian avatar condition and Appearance ($\beta = 1.02$, $p = .051$), and between the White avatar condition and Ownership ($\beta = 0.62$, $p = .073$), approached significance. The conditional and marginal R^2 values were .69 and .13, respectively.

4 Discussion

Regarding RQ1, this study investigated how avatar appearance affects EFL learners' WTC and related variables. The findings showed that avatar appearance did not significantly influence WTC or self-perceived communicative competence, but it did affect state anxiety and state communicative self-confidence. Specifically, participants reported lower anxiety and higher communicative self-confidence when using the White avatar compared to the baseline condition.

To interpret these findings, it is useful to consider how learners psychologically relate to avatar representations. Previous research suggests that idealized avatars aligned with users' ideal self can enhance well-being [23] and facilitate wishful identification [24]. However, idealistic avatars may also reduce performance compared to realistic ones [24]. Results in educational settings are also mixed. For example, Ratan et al. [25] reported that idealized avatars increased motivation, whereas Ratan et al. [26] found that future- or ideal-self avatars could negatively affect academic performance and self-efficacy when compared to avatars representing the actual self.

Building on this literature, the present study explored whether learners respond differently to avatars implicitly aligned with target language speaker identities. The White avatar was designed to represent a native English speaker, whereas the Asian avatar resembled participants' ethnic identity. Although no significant differences were found for the Asian avatar condition, participants reported significantly lower state anxiety and higher state communicative self-confidence in the White avatar condition compared to the baseline. These results suggest that some EFL learners may experience psychological effects—such as reduced anxiety—when embodying avatars that symbolically represent target language identities.

To address RQ2, the study further examined how embodiment relates to WTC across different avatar appearances. The LMEM revealed that WTC was largely driven by between-participant differences, as reflected in the high conditional R^2 (.90) and the comparatively low marginal R^2 (.04). This pattern suggests that WTC is influenced by individual differences. Nevertheless, significant interaction effects indicate that embodiment perceptions were differentially associated with WTC depending on avatar condition, supporting conditional rather than uniform avatar influences. In contrast, state anxiety, self-perceived communicative competence, and state communicative self-confidence were influenced not only by individual differences but also, to a modest extent, by avatar-related and embodiment-related perceptions, as reflected in higher marginal R^2 values (.12–.13). This suggests that state-level affective and self-evaluative outcomes may be more sensitive to embodiment-related experiences than WTC.

The interaction between the White avatar condition and Ownership—defined as the subjective perception that the virtual body belongs to oneself [27]—suggested that greater Ownership under the White avatar condition was associated with higher WTC, marginally reduced anxiety, and a tendency toward increased communicative self-confidence. In contrast, the interaction between the Asian avatar condition and Response, reflecting user's response to the virtual environment and the avatar [27], was negatively associated with WTC. Together, these findings support the view that the Proteus effect is partly driven by self-embodiment processes, as embodiment produces stronger behavioral changes than merely viewing the same visual input [28]. At the same time, the results highlight the complexity of avatar embodiment in EFL learning, suggesting that embodiment components may influence communicative and affective outcomes differently depending on avatar appearance.

However, these effects should be interpreted cautiously. The interaction between the White avatar condition and Multisensory—reflecting the integration of sensory inputs and perceived body location [21]—indicated that higher multisensory perception was negatively associated with state anxiety and communicative self-confidence, with a similar marginal trend for self-perceived competence. This pattern may be contrasted with the interaction between the Asian avatar condition and Appearance, the visual aspect of embodiment [27], where increased Appearance was associated with greater WTC and marginal tendencies toward reduced anxiety and improved self-evaluative outcomes. One possible interpretation is that when learners experience a stronger sense of bodily location while embodying the White avatar, they may feel increased pressure to behave in a more native-like manner, which could heighten anxiety and reduce self-confidence. In contrast, embodying the Asian avatar that is more similar to the self may allow learners to maintain a sense of self-consistency, thereby supporting more positive communicative experiences.

Overall, these findings highlight the complex interplay between avatar appearance and embodiment components in shaping learners' affective and communicative psychological states.

5 Conclusion

This study explored how avatar appearance influences EFL learners' WTC and embodiment, as well as how it moderates the relationship between embodiment and communicative outcomes, shedding light on the Proteus effect. The findings suggest that embodying avatars perceived as aligning with target-language speaker identities may influence learners' state-level affective outcomes, such as reducing anxiety and enhancing communicative self-confidence. However, these effects were not uniform across all learners or embodiment components. In particular, Ownership under the White avatar condition was associated with more positive communicative self-perceptions, whereas higher Multisensory embodiment was negatively associated with state anxiety and communicative self-confidence, with a similar marginal trend for self-perceived communicative competence.

These interpretations should nevertheless be approached with caution to avoid reinforcing stereotypes, such as equating English proficiency exclusively with whiteness or native-speaker imagery.

This study extends prior research on the Proteus effect by providing evidence from the context of language learning, using the WTC scales as key measures. Future studies should further investigate the psychological mechanisms underlying the interplay among avatar appearance, embodiment, and learners' affective and communicative self-evaluations in immersive VR environments.

Acknowledgments

This study was supported by JSPS KAKENHI (Grant Number JP 24K16763). The authors would like to thank all participants who participated in this study.

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