



Verbal and nonverbal communication in high-immersion virtual reality for language learners

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Abstract. Virtual Reality (VR) offers language learners a valuable environment for practicing language skills and other aspects essential for language development, interaction, and negotiation of meaning. For example, speaking practice in VR using avatars can reduce speaking anxiety and increase users' sense of agency. Social spaces in VR present possibilities for verbal and nonverbal communication. This conceptual paper discusses the advantages and drawbacks of both types of communication in high-immersion VR and the implications for language learners. Language learners rely on multiple modes of communication, including nonverbal behavior such as gestures. However, VR often lacks behavioral anthropomorphism, i.e. when an avatar cannot speak, move, or act in a human-like way, which may negatively impact communication, especially at beginner level.

Keywords: high-immersion VR, language learning, verbal and nonverbal communication, online social spaces.

1. Verbal and nonverbal communication

While interacting, interlocutors depend on Verbal Communication (VC) and NonVerbal Communication (NVC). VC can be spoken or written and uses words (i.e. language, see [Rocci & de Saussure, 2016](#)). Speech in a face-to-face format differs from that in VR format because faces are shielded through an avatar in

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VR (i.e. a representation of self in virtual settings). Written communication in VR spaces typically takes place using chats or personal messages.

NVC, such as facial behavior, gaze, gestural behavior, and spatial behavior, plays an important role in human interaction (Chun, Karimi, & Sañosa, 2022). Facial expressions and gaze reveal information, emotional states, attention, and intention (Maloney, Freeman, & Wohn, 2020). Gestural behavior including hand movements can support and replace verbal behavior. Spatial behavior, or proxemics, refers to the measurable distances between interlocutors and is culturally dependent (Maloney et al., 2020). NVC can convey information regarding a person's willingness to communicate and to listen (Barkai, 1990). It can also regulate interactions, for instance, when nodding is used to signal turn-taking (Aburumman, Gillies, Ward, & Hamilton, 2022). In a language learning context, NVC is particularly important because audiovisual presentation facilitates language learners' perception and recognition of foreign sounds (Davis & Kim, 2001). In this paper, we use the terms nonverbal communication and nonverbal behavior interchangeably.

2. VR-assisted language learning and verbal and nonverbal communication

Given the growing interest in VR-assisted language learning (Dhimolea, Kaplan-Rakowski, & Lin, 2022) and the fact that communication is key in language learning, our article discusses how VC and NVC take place within various VR spaces and what possible shortcomings of VR technology currently exist regarding communication.

We focus on high-immersion VR, which is defined as “computer-generated 360° virtual space that can be perceived as being spatially realistic, due to the high immersion afforded by a head-mounted device” (Kaplan-Rakowski & Gruber, 2019, p. 552). Wearing a head-mounted device, known as a VR headset, offers embodiment, sense of presence, and immersion. High-immersion VR allows for an embodied interaction and a wide range of NVC (Maloney et al., 2020). Interlocutors in VR can use a haptic system (i.e. virtual hands), which allows for making gestures and acting in other ways that feel natural and, consequently, increase the embodied cognition. Social VR applications (e.g. vTime and BigScreen VR) enable avatar-mediated interaction between users and often include novel options for nonverbal behavior using virtual emojis (see Figure 1 below) to compensate for the lack of facial expressions.

VR-specific interactional patterns and norms may develop and influence each other (Ahlers, Lazović, Schweiger, & Senkbeil, 2020). High-immersion social VR can impact interaction regarding topic choice (Gruber, Canto, & Jauregi-Ondarra, forthcoming) and, as a result, can influence learners' lexical choice. While VC depends on users' own voice and their written input, NVC is conveyed through users' avatars with limited gestures and animations that are often pre-programmed (Maloney et al., 2020).

In language learning contexts, social VR apps can be used for a variety of communication constellations such as one-on-one tutoring (Kaplan-Rakowski & Gruber, 2021), larger group tutoring (as in the case of Immerse), collaborative international learning, and intercultural encounters (Ahlers et al., 2020; Gruber et al., forthcoming; Jauregi-Ondarra, Gruber, & Canto, 2021). In these interactions, users' voices are their own, and users are personified as customized avatars (see Figure 2 below). While users of social VR apps in noneducational settings sometimes choose to rely only on NVC for privacy and disable the voice function (Maloney et al., 2020), language learners using social VR apps are typically expected to complete tasks orally in the target language.

Before 2022, VR headsets could only convey subtle emotional cues until the release of Meta Quest Pro, which introduced full face and eye tracking allowing to facilitate NVC. Although NVC is integral to language learning, research on verbal behavior and NVC is limited.

Figure 1. Virtual emojis (<https://hubs.mozilla.com/docs/hubs-features.html>)



Figure 2. Collaborative interaction in VR



Although NVC is integral to language learning, research on verbal behavior and NVC is limited. Peixoto, Melo, Cabral, and Bessa (2021) explored the avatars' body animations and lip synchronization on listening comprehension in an English as a foreign language setting. The results indicate that avatars with realistic animations, movements, and lip synchronization positively affect the users' sense of presence, learning, and overall experience. A lack of lip synchronization during avatar-to-avatar communication can negatively affect language comprehension (Kaplan-Rakowski & Gruber, 2021) because language learners must rely mostly on live voice input and paralinguistic features such as nonverbal vocal qualities.

3. Implications, future directions, and conclusion

Educators need to consider learners' limited choices as well as the novel options available regarding verbal and nonverbal behavior in social VR applications and

their impact on learners' interactions. Commercial VR apps do not typically offer face tracking, which can make communication more challenging. The use of VR-inherent NVC options such as virtual emojis may influence and change learners' interactional patterns, including their verbal behavior, and their use of strategies to communicate successfully. The lack of lip-reading opportunities may mean that learners rely on and, thus, train their listening skills to decipher spoken text. Although research indicates that Foreign Language Anxiety (FLA) can be reduced in VR (Gruber & Kaplan-Rakowski, 2020, 2022), the need to predominantly attend to verbal behavior and the lack of lip synchronization may impact FLA. Research is required to understand the effect of VR-inherent verbal and nonverbal behavior options on FLA.

Furthermore, no study has examined whether and how language learners compensate for the lack of facial expressions, especially at lower proficiency levels. Little attention has been paid to language learners' negotiation of meaning and compensation strategies when faced with time lags and technological glitches. The possible effect of limited nonverbal cues on language learners' cognitive load and social presence during VR interactions should be explored. Furthermore, research is needed to understand whether and how spatial behavior in VR and the use of virtual emojis are culture-dependent and whether language learners notice cultural differences in such context.

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