

Combining Technologies, Speech and Psychological Sciences for Public Speaking Research and Training: An Overview

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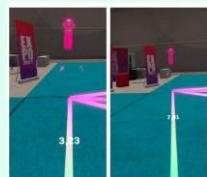
Research

VR Validation of real-world resemblance ¹

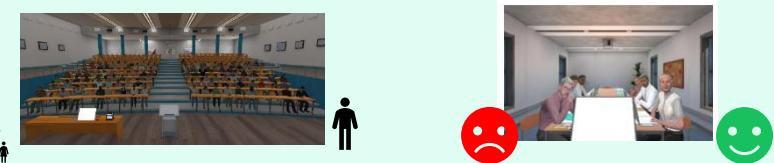


VR and communication distances ²

Longer virtual distances
↑ vocal-effort



Influence of VR audience size and behavior ³



Relationship between voice and body language ⁴

↑ Gesture
↑ voice resonance

Use of both hands
↑ pitch

Standing on heels
↑ pitch variability

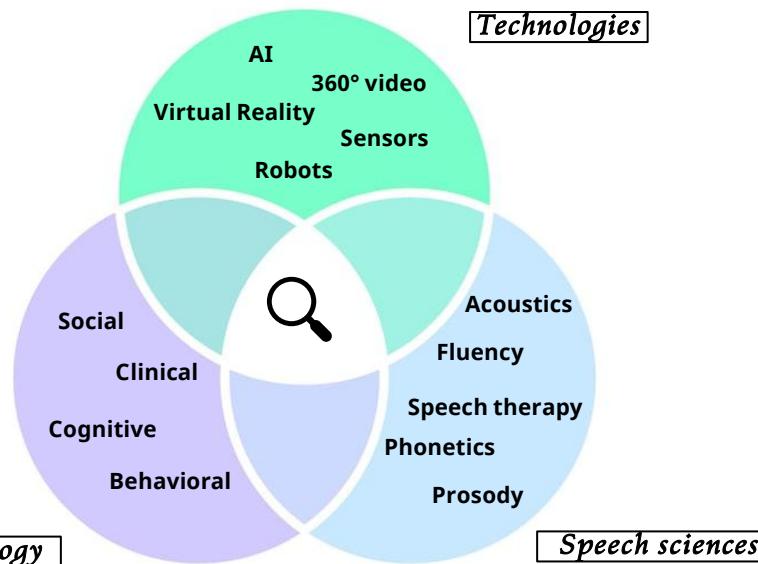
↑ Steps
↑ pauses
↓ articulation

Acoustic speech features in robots ⁵



Charismatic speech in robot
↑ team creativity
↑ performance

Public speaking is a complex and important skill higher education students must acquire, as it can impact their future career success, reputation, and credibility. However, research in this domain remains scarce and heterogenous. We propose an overview of work combining technologies, speech and psychological sciences to maximize understanding of this activity.



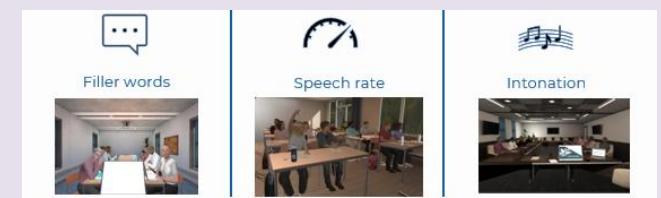
Training

Unguided ⁶ and embodied ⁷ VR training



↓ Self-assessed anxiety
↑ Persuasiveness
↑ Charisma

VR and speech therapy ^{8,9}



Loudness optimization in VR ¹⁰



Vocal effort modifications

¹Bettahi, L., Remacle, A., Schyns, M., Etienne, E., Etienne, A.-M. & Leclercq, A.-L. (submitted) Validating Virtual Reality for Public Speaking Research and Intervention: Comparing Anxiety, Voice, and Fluency Responses to Real and Virtual Audiences, *Frontiers in Virtual Reality*.
²Selck, K., Albert, T., & Niebuhr, O. (2023). "And miles to go before..."—Are vocal-effort levels in speech adjusted to VR communication distances?. *Proceedings of the 13th Nordic Prosody Conference*, 176.
³Bettahi, L., Leclercq, A.-L., & Remacle, A. (2025, December). Prise de parole en public et réalité virtuelle : Influence de l'attitude d'une audience virtuelle sur la voix, la parole et l'anxiété. *Groupe de Contact de Psycholinguistique et Neurolinguistique (GCPN)*
⁴Niebuhr, O., & Valls-Ratés, Ì. (2024, July). Gestures and Feet Can Tell Us how You Speak! On the Relationships between Voice and Body Language in VR Public Speeches. In *2024 IEEE International Professional Communication Conference (ProComm)* (pp. 96-104). IEEE.
⁵Fucinato, K., Niebuhr, O., Nørskov, S., & Fischer, K. (2023). Charismatic speech features in robot instructions enhance team creativity. *Frontiers in Communication*, 8, 1115360.
⁶Valls-Ratés, Ì., Niebuhr, O., & Prieto, P. (2022). Unguided virtual-reality training can enhance the oral presentation skills of high-school students. *Frontiers in Communication*, 7, 910952
⁷Valls-Ratés, Ì., Niebuhr, O., & Prieto, P. (2023). Encouraging participant embodiment during VR-assisted public speaking training improves persuasiveness and charisma and reduces anxiety in secondary school students. *Frontiers in Virtual Reality*, 4, 1074062.
⁸Bettahi, L., Leclercq, A.-L., & Remacle, A. Comment améliorer nos prises de parole en public ? Proposition d'un entraînement en réalité virtuelle chez des étudiants universitaires. (2025)
⁹Remacle, A., Bouchard, S., & Morsomme, D. (2023). Can teaching simulations in a virtual classroom help trainee teachers to develop oral communication skills and self-efficacy? A randomized controlled trial. *Computers & Education*, 200, 104808.
¹⁰Valls-Ratés, Ì., & Niebuhr, O. (2025, September). From quiet to confident: A VR tool for loudness training in educational public speaking. In *Proc. SLATE 2025* (66-70).