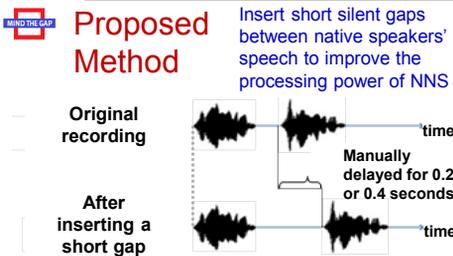
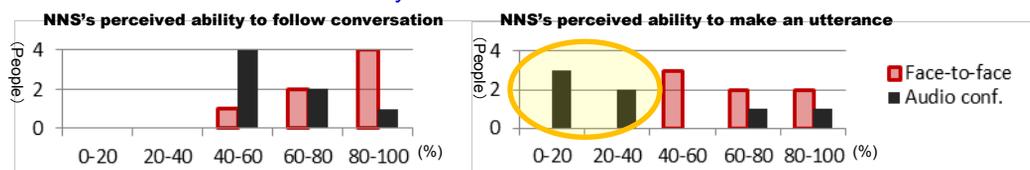




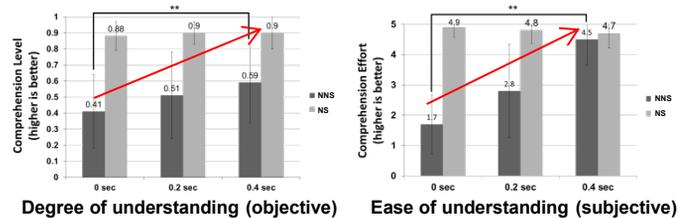
How transmission lags influence multilingual communication

Abstract— Previous research has shown that audio communication is particularly difficult for non-native speakers (NNS) during multilingual collaborations. NNS are overburdened both by having to communicate with imperfect language skills, and by the need to compensate for distorted audio signals. To give NNS more time to process conversations, we tested the insertion of silent gaps (from 0.2 to 0.4 seconds) between conversational turns, and observed a significant improvement in NNS’ understanding of pre-recorded conversations. In a real-time audio conference, an added artificial delay between the conversations of native speakers provided a combination of beneficial and detrimental effects for both native and non-native speakers. The findings have implications as regards how audio conferencing can be improved for NNS.

Motivation 70% of interviewed Japanese researchers felt that they are **not** able to say half of what they would like to in international conference calls



Understanding Recorded Conversations



Effects in Real-Time Conference Calls

Gap Length	Effects on Non-Native Speakers		
	0 sec	0.2 sec	0.4 sec
Average rate of spontaneous speech	0.76	0.81	0.69
Speaking effort (5pt Likert scale: higher is better)	3.1	3.4	2.3
Comprehension effort (5pt Likert scale: higher is better)	4.1	4.1	3.5
Frustration (5pt Likert scale: lower is better)	2.9	2.7	3.1

Effects on Native Speakers

Gap Length	0 sec	0.2 sec	0.4 sec
Speaking effort (5pt Likert scale: higher is better)	4.2	4.2	4.0
Comprehension effort (5pt Likert scale: higher is better)	4.4	4.5	4.3
Frustration (5pt Likert scale: lower is better)	1.7	1.8	2.1
Percentage of conversations initiated simultaneously	22%	33%	41%
Frequency of speaker switches (# of speaker switches per min.)	7.8	7.3	6.6

Inserting silent gaps in a pre-recorded audio conference significantly increases NNS understanding of the conversation. Longer gaps in real-time conference calls benefits NNS understanding, but makes the conversation feel unnatural.

Related works

- [1] N. Yamashita, A. Echenique, T. Ishida, A. Hautasaari, "Lost in Transmittance: How Transmission Lag Enhances and Deteriorates Multilingual Collaboration," in *Proc. CSCW'13*, pp. 923-934, 2013.
- [2] N. Yamashita, A. Echenique, E. Kuzuoka, T. Ishida, A. Hautasaari, "A Method that Ease the Burden of Non-native Speaker's Participation in Conference Calls," *IPSSJ Transaction*, 2013 (to appear).

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