

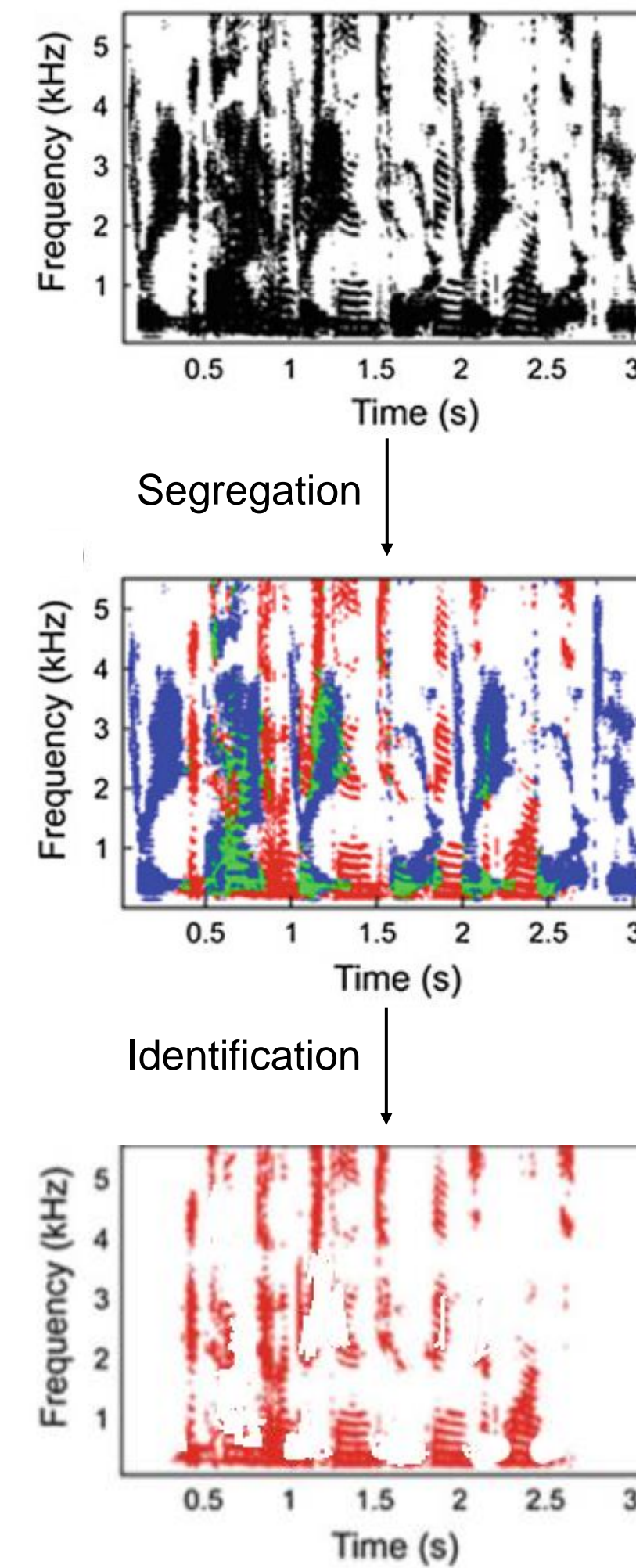
How well do hearing aids amplify “speech glimpses” in multitalker mixtures?



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BACKGROUND

- Speech understanding in multitalker mixtures requires both segregation of the target from distractors and identification based on partial information (or “speech glimpses”).
- Identification based on speech glimpses is particularly susceptible to subtle reductions in bandwidth (Best et al 2019) and audibility (Best et al 2017).
- An implication is that restoring audibility across the spectrum for individuals with hearing loss is especially critical for identification of speech in multitalker mixtures.



AIMS & RATIONALE

- Here we asked whether current hearing-aid amplification strategies adequately restore the audibility of speech glimpses.
- In a multitalker mixture, gain and compression may often be driven by the maskers and it is difficult to know how audible the target actually is.
- There may also be opposing effects that counteract improvements in target audibility (Overby et al 2023):
 - amplification of maskers may make them more distracting and harder to ignore
 - non-linear processing may distort natural cues for segregation of competing talkers (e.g., cross-modulation, spatial cue distortion).
- Are these opposing effects why hearing aids are often not helpful in real-world multitalker situations?

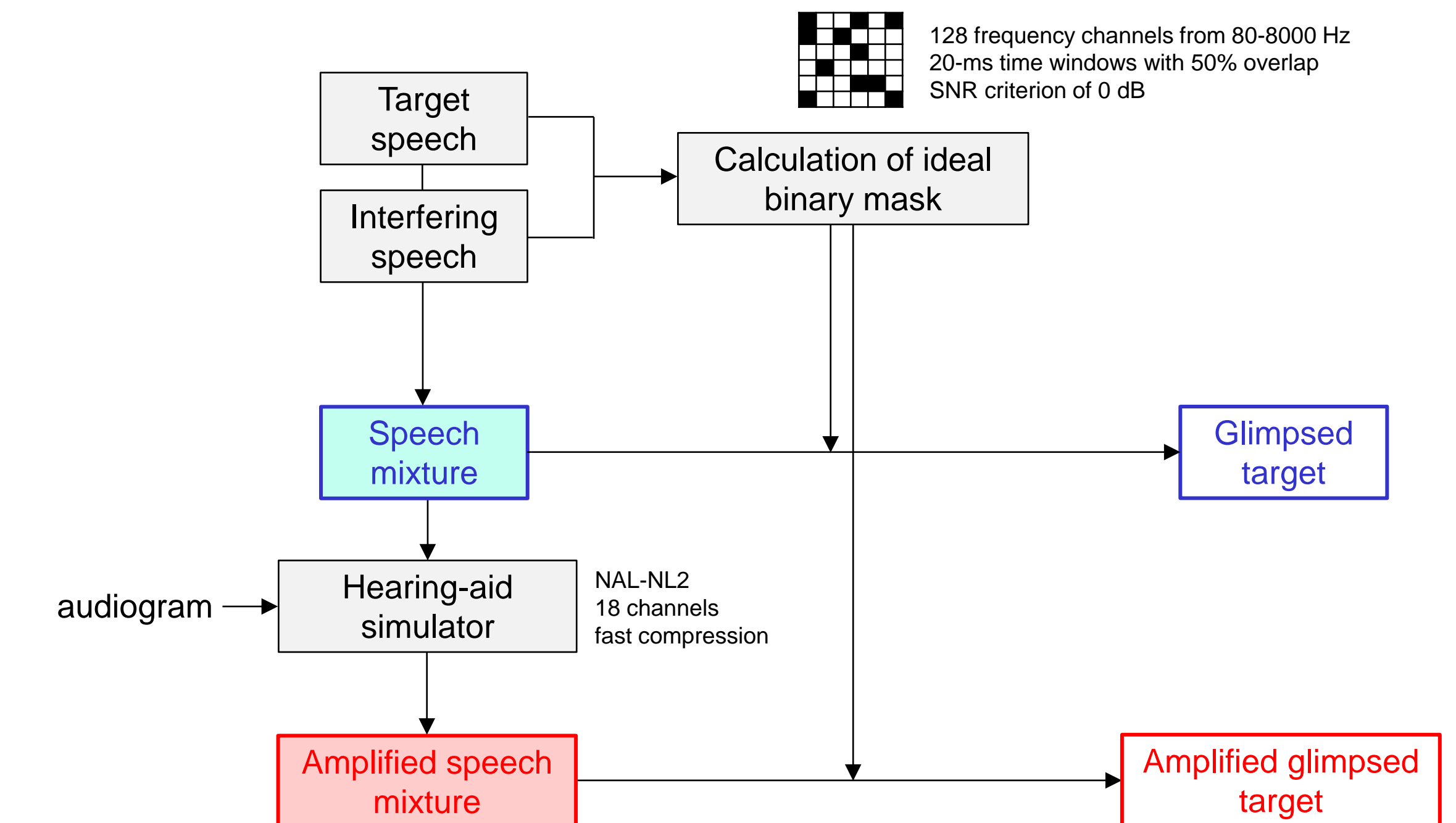
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APPROACH

- Ideal time-frequency separation (Brungart et al 2006) used to isolate speech glimpses from unaided and aided speech mixtures.
- Stimuli were mixtures of a target sentence (female, 65 dB SPL) and two masker sentences (male, variable level) presented via headphones.
- Individualized non-linear amplification (NAL-NL2) applied using a hearing-aid simulator (Oldenburg openMHA; Kayser et al 2022).
- Participants were 10 younger adults (age 19-40) with bilateral sensorineural hearing loss. 7 were regular hearing-aid users.



RESULTS

- On average, amplification did improve the audibility and intelligibility of the target speech glimpses. These improvements were reduced in the mixture, suggesting that there were counteracting effects.
- On an individual level, this pattern was true for about half of the participants. For others, amplification did not clearly improve the intelligibility of target speech glimpses.
- This approach provides a useful way to unpack positive and negative effects of hearing-aid processing in multitalker mixtures.

