Informational interference from a competing talker: a thought-provoking but elusive construct

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Informational interference from a competing talker: a thought-provoking but elusive construct

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Background

Research questions

Overarching research question

1) Is a competing talker (EM+IM) more detrimental to sentence comprehension than energetic masking?

Yes: Koelstra et al. (2012), Brungart et al. (2001), Brungart et al. (2013) No: Dirks and Bower (1969), Hygge et al. (1992)

Specific research questions

Does the emergence of informational interference depend on the:

1) Linguistic complexity of the target speech?

More syntactic complexity → higher demand on processing resources, e.g., Carroll & Ruijendijk (2013), Wendt et al. (2014)

2) Intrinsic processing capacity of the listeners?

E.g. second-language listeners expend more processing resources to recognise and understand speech (Lucemberri et al., 2010)

3) Intelligibility of the target speech?

E.g. high perceptual demands due to decreased signal-to-noise ratio

4) Content of the competing signal?

If attention is automatically allocated to the competing signal, different contents will interfere differently with target processing.

Method

Participants

➢ Native listeners (L1 English), N = 36 (per experiment)
➢ Non-native listeners (L2 English, L1 Danish), N = 19

Materials

➢ Target voice

Simple sentence (125) Show the girl with the black gloves
Subject Relative (95) Show the girl who is holding the boy
Object Relative (40) Show the boy who is the boy holding

➢ Competing voice

Mask type

No mask

HINT competing talker (EM+IM)

Speech-modulated noise (EM)

Reversed competing talker (EM)

Neutral competing talker (EM+IM)

Incongruent competing talker (EM+IM)

Congruent competing talker (EM+IM)

Mask type

The tap is leaking. Some animals sleep on straw.

The black dog was hungry. The yellow pears taste good.

Strawberry jam is sweet. The kitchen clock was wrong.

The parrot with the original puzzle is actually sweet.

The koala that is chewing the leaf is unbearably smelly.

The leaf that the koala is chewing is unbearably smelly.

The boy who is holding the girl is unfortunately poor.

The koala which is chewing is unfortunately poor.

The girl who is holding the boy is unfortunately poor.

The boy who the girl is holding is interestingly great.

The girl who the boy is holding is interestingly great.

SNRs -5dB = 95% transcription accuracy without pictures

-22dB (SMN) and -25dB (RCT & CT) = 80% transcription accuracy with pictures

Results

Reaction times from target sentence onset

IM vs EM

SNR: -5dB

N = 36 natives

Accuracy

➢ At -5dB SNR, L1 and L2 listeners highly accurate (>90%)

➢ Effect of syntactic complexity (except L1 listeners at -5dB SNR)

Eye fixations

➢ Fixations to correct character were made before the end of the target sentence

➢ No difference between masks at -5dB SNR

➢ Difference between unmasked and masked eye fixations at low SNRs.

Pupilometry

➢ Peak pupil dilation as a measure of processing load

➢ No difference between masks at -5dB SNR

➢ Difference between unmasked and masked peak pupil dilation at low SNRs.

Cognitive measures

➢ No correlations were found between any of the cognitive measures and the reaction times or accuracy for the sentence comprehension task.

Conclusions

1) Is a competing talker more detrimental to sentence comprehension than energetic masking?

Not always! No effect of informational interference found in this study.

Specific questions: does the emergence of informational interference depend on the:

2) Linguistic complexity of the target speech?

Main effect of syntax, but not modulated by mask type.

3) Intrinsic processing capacity of the listeners?

L2 listeners use more processing resources, but not modulated by mask type

4) Intelligibility of the target speech?

Effect of mask vs no mask at low SNR, but not modulated by mask type.

5) Content of the competing signal?

Semantic priming indicates that the mask is not always ignored. Suppression of irrelevant/incongruent mask: strategic informational filter?

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References


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