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Auditory-visual Perception of VCVs Produced by People with Down Syndrome: a Preliminary Study

Context

ComEns research project
"Communiquons Ensemble" (Communicating together): Co-construction of the communicative space between people with Down Syndrome and 'ordinary' people

website (under translation):
www.communiquonsensemble.com

Purpose

- Evaluate the intelligibility of speech produced by people with Down Syndrome (DS)
- Analyse AV integration and compare with 'ordinary' speakers

Background

- Lack of studies of speech intelligibility of people with DS, especially quantitatively
- No studies on AV perception of speech produced by people with DS: **can the visual modality improve speech intelligibility?**

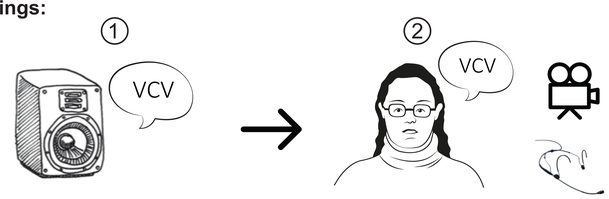
Methods

Material

Speakers:
- 2 with DS (1f) & 2 'ordinary' (1f)
- native speakers of French

Speech material:
- 16 Vowel-Consonant-Vowel (VCV) sequences
- V=/a/
- C: 16 French consonants (covering places and manners of articulation of French)

Recordings:



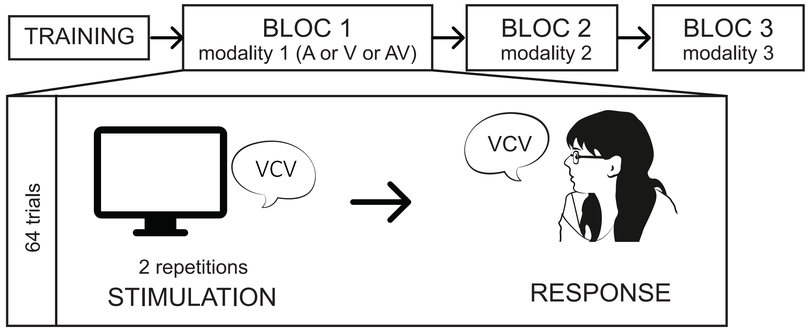
AV stimuli construction:
- addition of Cocktail Party Noise (SNR = -4dB)

Design

Within subject factors:
- modality (A vs V vs AV)
- speaker group (DS vs 'ordinary')

Between subject factor
- modality presentation order

Paradigm



Participants: 24 'ordinary' native speakers of French (12f; age: mean = 25,1 - sd = 3)

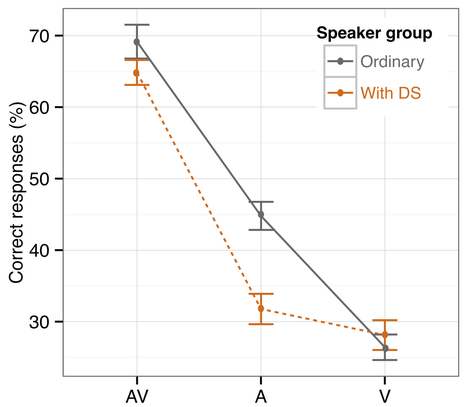
Analysis

participant's response (example: pata)				
BeforeV1 (ex:/p/)	V1 (ex:/a/)	C (ex:/t/)	V2 (ex:/a/)	AfterV2 (ex://)

Results

Correct responses

Before V1=//
V1=/V/
C=/C/
V2=/V/
AfterV2=//



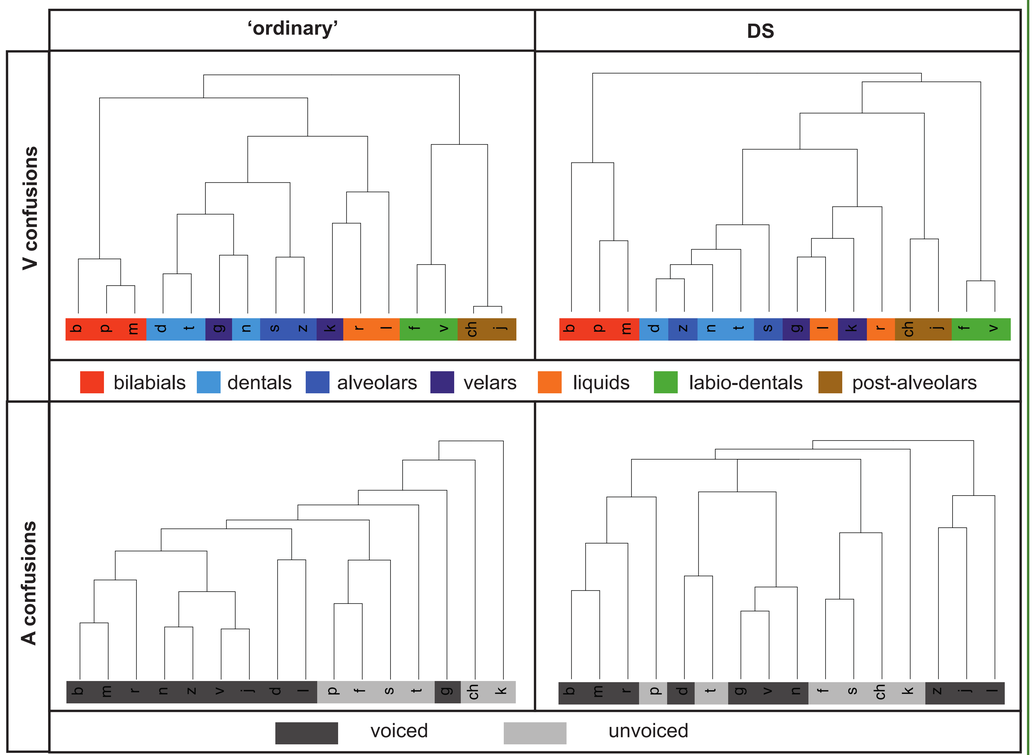
Errors

Insertions before V1 and/or after V2
(BeforeV1 ≠ // and/or AfterV2 ≠ //)
- mainly insertion of a single C
- DS ~ ord except in A: more consonant insertions for DS

Errors on V1
- AV and V: no differences between groups
- A :
  * confusion with another V: DS ~ ord
  * non perception of V: DS >> ord
  * DS: non perception >> confusion

Errors on V2
- almost no non perceptions
- AV and V: no differences between groups
- A: sig. more confusions for DS

Errors on the consonant (C)
- most frequent type of errors
- mostly confusions with another C



Conclusions

- Reduced auditory only speech intelligibility for speech produced by people with Down Syndrome (DS)
- No difference in visual speech intelligibility: it is not more difficult, at least for our speakers, to lipread speech produced by a person with DS than that produced by an 'ordinary' person
- No real difference in auditory-visual speech intelligibility

→ The visual speech information is not degradaded in the speech of our two speakers with DS and seems to compensate for the degradation of the acoustic information.

- The most frequent errors are confusions of the consonant with another consonant.
  Confusion trees: the difference between groups is mainly observed for auditory perception.

→ It is more difficult to perceive the voiced/unvoiced feature in speech produced by people with DS.

- Perception of vowels: the first vowel is significantly more often not perceived in the speech of people with DS.

→ People with DS have difficulties producing initial vowels.

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