Elicitation and analysis of a robust word misperception corpus in Spanish

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**Motivation**

Speech misperceptions consistent across listeners can give valuable insights into human speech perception and can be used to refine and evaluate computational models of speech perception. Contrasting with previous work [1, 2, 3, 4] which focused on anecdotal reports of individual ‘slips of the ear’, we propose the laboratory elicitation of 3000+ Spanish word misperceptions in noise. We conduct a phonetic analysis on the confusions presented, as well as introduce a novel categorisation scheme based on the amount of information recruited from the masker present in the confused word.

**Methods**

Speech materials

3962 high frequency, 1-3 syllable Spanish words recorded by two male and two female talkers.

Maskers

SSN: Speech-shaped noise
BMN1: Speech modulated noise
BMN3: 3-talker babble mod. noise
BAB4: 4-talker babble
BAB8: 8-talker babble

SNR ranges were set for each of the above maskers based on [5] as well as pilot tests, and range from 1 to −4 dB for informational and −3 to −13 dB for energetic maskers.

Procedure

Adaptive techniques which prune tokens that are unlikely to lead to consistent confusions yielded a 2.6-fold increase in interesting confusion discovery rate over earlier non-adaptive techniques [5, 6].

Listeners

173 young adults (monolingual in Spanish or bilingual in Spanish/Basque) screened up to 20 blocks of 100 tokens each. A maximum of 15 listeners heard the same token.

See [7] for more details on elicitation and analysis of the corpus in its initial state.

**Outcome**

- 308 157 responses to 53 039 different tokens were collected.
- 3270 ‘interesting’ confusions with minimum listener agreement of 6 of 15.
- Interesting token discovery rate: 9.6 per listener hour.

**Automatic classification of confusions**

- Confusions ranked in quiet (rq) and after applying EM model (rEM) [8]
- 3-state 10 mixture triphone HMMs with cochleagram representations
- Acoustically similar: rq <= 3
- Reinterpretation: rEM <= 10 & rEM <= rq/2
- Override: confused word can be found in babble

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**Discussion**

- Microscopic perception models such as the missing data recognizer [8] and the glimpse decoder [9] can be helpful in identifying the origin of confusions.
- In turn, robust speech misperception helps refine computational speech perception models.
- Follow-up testing will determine which properties of the target and masker combination lead to the misperception.
- The corpus will be made available to the community as an open resource.

**References**


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