Background:

A. Interaction of Prosody and Lexical Content

- On the radio, you hear the talk show host saying ‘I feel wonderful.’
  - His tone of voice (Prosody) conveys either happiness or anger. How would you interpret this?

B. The Gap in the Literature

- To partake effectively in a social dialogue, it is essential to identify, understand and respond appropriately to the emotions conveyed in speech.
- But how are these dimensions (Lexical Content and Prosody) weighed?
- Only a small number of studies have examined this interplay (see Zupan & al, 2009).
- Extensive failures of selective attention to both dimensions indicate that selective attention to the prosody advantage for Anger ratings > Fear ratings.

Method

- Participants: 80 students (mean age 19), native English speakers, normal audiometric thresholds.
- Stimuli: 50 linguistically equated sentences, each of which were reliably associated with one particular emotion (Ben-David, et al, 2011). An actress recorded these sentences in each of the five tested prosodies. The Root Mean Square intensity of all sentences was equated. The top rated spoken stimuli:

Procedure: Sentences were presented through headphones in a sound booth in 3 blocks:

- Combined-dimensions (prosodic and lexical) rating. Rating the spoken sentence as a whole.
- Prosody rating. Selectively attending only to the prosody, ignoring the lexical content.
- Lexical-content rating. Selectively attending only to the lexical content, ignoring the prosody.

In each block, sentences were rated four times: “How much do you agree that the speaker is ____” (Happy/Angry/Sad/Fearful) on a 1-6 scale.

Analysis:

Selective Attention: a confusion matrix analysis.
- The impact of prosody on lexical ratings: Significant paired t-tests comparing aggregated scores in the red column (prosody) with the other three - failure of selective attention to the lexical content.
- The impact of lexical content on prosody ratings: Significant paired t-tests comparing aggregated scores in the red row (lexical) with the other three - failure of selective attention to the prosody.

Integration of Emotions

- Combined dimension rating – similar confusion matrices for both aggregated columns and rows. All tests (8) were significant indicating that participants were using both the lexical and the prosodic dimension.
- Prosody advantage – in both emotions the average for prosody sentences (e.g., Anger column) was higher than for the lexical sentences (e.g., Anger row). Yet the prosody advantage for Anger ratings > Fear ratings.
- Average correlation coefficients of combined-dimension ratings, with prosody/lexical rating of the same emotion. Anger: Combined&Pros .30 > Combined&Lex .16; Fear: Combined&Pros .33 > Combined&Lex .25

Conclusions:

- Data show the complexity of how the two dimensions, Lexical Content and Prosody, interact in spoken language.
- Extensive failures of selective attention to both dimensions indicate that rating of emotions in speech is impacted by both Prosody and Lexical Content.
- A general primacy for prosody in rating is emotion-dependent: While for Anger, the Prosody is the main source for rating, Fears ratings rely on a more equal combination of Lexical Content and Prosody.
- T-RES can be a useful tool for assessment and rehabilitation of communication skills, as difficulty in identifying emotions in speech has significant impacts on the rehabilitation of several pathological populations.

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