Prosodic Features of Stance Acts

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• ATAROS
  – Automatic Tagging and Recognition of Stance
  – Collaboration with phoneticians, computational linguists, signal-processing engineers
    – Hosted at the University of Washington
  – Seeks automatically-extractable acoustic cues to stance

  – Also Marvel god of video games
Terms

• Stance
  – Speaker’s attitudes, opinions, feelings, judgments about topic of discussion (Biber et al. 1999; Conrad & Biber 2000)
    • Related: evaluation, attitude, sentiment, subjectivity
  – Stance-taking
    • Activity of expressing stance (Haddington 2004)

• Stance act
  – Speech act involving stance-taking
Prosodic Cues to Stance

• Pitch, intensity increase with stance strength

• Positive stances: longer stressed vowel duration (~slower speaking rate)
  • cf. Freeman (2015), Freeman (2016) LSA talk

• Some stance types distinguished by combinations of prosodic measures
  • cf. Freeman et al. (2015)
ATAROS Corpus

• High-quality audio
• 34 dyads from Pacific Northwest
  – Strangers matched by age group
• 5 collaborative tasks
  – Frequent changes in stance
• Transcribed, time-aligned to audio
• Annotated for stance strength, polarity, type
• Available to other researchers
Tasks

<table>
<thead>
<tr>
<th>Store items</th>
<th>Neutral first-mentions</th>
<th>Increasing involvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Budget items</td>
<td>Map</td>
<td>Inventory</td>
</tr>
<tr>
<td></td>
<td>Category</td>
<td>Survival</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Budget</td>
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</table>
Inventory Task

- Scenario: You’re co-managers of a new superstore in charge of arranging inventory
- Decide together where to place each target item on a felt wall map

- Low involvement, weak opinions, agreement
Inventory Task

– W- We should-
– So, fridge-
– We should- make a- a- a decision where beverages should go, anyway. So, it doesn’t-
– Yeah.
– I don’t think it’s a big… huge decision to s-
– We could do b- beverages like here.
– Sure.
– Maybe.
– Perfect.
Budget Task

• Scenario: You’re on the county budget committee, and it’s time to make cuts
• Decide together which expenses to cut from each department
• High involvement, stronger opinions, more persuasion, reasoning, negotiation, personal experience as support
Budget Task

— {breath} Alright. .. Wh- Poetry books .. or cooking classes?
— No, if you're gonna leave in football, we need poetry.
— Oh we're not g- Oh - oh, I'm willing to take out - {breath} 
— Oh, football equipment?
— Yeah.
— Oh.
— So if we take out the juice machines and football, we've done it.
— Okay.
Transcription & Annotation

- Manual orthographic transcription in Praat (Boersma & Weenink 2013)
- Forced-alignment w/ P2FA (Yuan & Liberman 2008)
- Manual stance annotation
  - 2-3 annotators identify, label “stancey” expressions via content analysis (modified from Freeman 2014)
  - Stance Strength (none, weak, moderate, strong)
  - Stance Polarity (positive, negative, neither/neutral)
  - Stance Act Type
Stance Act Types

- Offering opinion
- Soliciting opinion
- Convincing/reasoning
- Agreement
- Disagreement
- Reluctance to accept
- Softening/hedging

- Rapport-building
- Encouragement
- Backchannels
- Strong intonation
- Unclear
- None
<table>
<thead>
<tr>
<th>Stance Act Type</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>a Agreement</td>
<td>“I agree, absolutely”</td>
</tr>
<tr>
<td>at Agree w/ rapport</td>
<td>“Yeah, now we’ve got it!”</td>
</tr>
<tr>
<td>r Reluctance to accept</td>
<td>“Well, … maybe”</td>
</tr>
<tr>
<td>f Softening/hedging</td>
<td>“I don’t know, that’s just me”</td>
</tr>
<tr>
<td>b Backchannels</td>
<td>“Mm-hm”</td>
</tr>
<tr>
<td>i Strong intonation</td>
<td>e.g. incredulous, mocking; may be hard to categorize</td>
</tr>
</tbody>
</table>
Hypothesis & Measures

- Measurable cues to stance type are present in the acoustic signal
  - Same words, different messages…

- Automatically-extracted measures:
  - Pitch, intensity at vowel midpoint & every decile
    - Z-score normalized within speaker
  - Vowel duration
    - Z-score normalized within speaker & vowel quality
Data Set

• 20 dyads
  – Dyads: 7 FF, 3 MM, 10 mixed-sex
  – Speakers: 24 F, 16 M (half under age 35)

• Inventory & Budget task data combined

• 32,000 stressed vowels from content words
Pitch Contours by Type

- Clusters:
  - Reluctance, strong intonation (r, i) high
  - Agreement (a) mod-low dipping
  - Backchannels (b) low

Results
Intensity Contours by Type

- Clusters:
  - Rapport-building agreement (at) very high
  - Agreement (a) dropping
  - Backchannels (b) low dropping
  - Softening (f) low
<table>
<thead>
<tr>
<th>Act Type</th>
<th>Pitch</th>
<th>Intensity</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>r; i reluctance; intonation</td>
<td>very high</td>
<td></td>
<td>long</td>
</tr>
<tr>
<td>at agreement w/ rapport</td>
<td>very high</td>
<td>very high</td>
<td>very long</td>
</tr>
<tr>
<td>a agreement</td>
<td>low-dipping</td>
<td>dropping</td>
<td>long</td>
</tr>
<tr>
<td>b backchannel</td>
<td>very low</td>
<td>low-dropping</td>
<td>long</td>
</tr>
<tr>
<td>f softening / hedging</td>
<td>low</td>
<td></td>
<td></td>
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Conclusion

• Measurable cues to stance type are present in the acoustic signal
  – Prosodic features on stressed-content vowels
  – Stance act types distinguished by combination of prosodic measures

• Future work
  – Prosodic contours/tunes over acts
  – Social variables
    • Age, gender, familiarity, power, rapport…
References


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• PhLEGMe members (Indiana University phonetics group)
• The ATAROS team ([ataros@uw.edu](mailto:ataros@uw.edu)):
  – PIs: Gina-Anne Levow, Richard Wright, Mari Ostendorf
  – Comp. Ling. RAs: Yi Luan, Julian Chan, Trang Tran, Alena Hrynkevich, Victoria Zayats, Maria Antoniak, Sam Tisdale
  – Annotators: Heather Morrison, Lauren Fox, Nicole Chartier, Marina Oganyan, Max Carey, Andrew Livingston, Phoebe Parsons, Griffin Taylor
• Corpus access: [depts.washington.edu/phonlab/projects.htm](http://depts.washington.edu/phonlab/projects.htm)
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