Exploring task and gender effects on stance-taking in a collaborative conversational corpus

Valerie Freeman
Indiana University

N WAV 44: Intersections
University of Toronto
October 25, 2015
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
Terms

- ATAROS Project
  - 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
Related Work

• Conversation Analysis & Discourse Analysis
  – Qualitative, often small amounts of data

• Computational Linguistics/Speech Recognition
  – Often relies on text or lexical features, but much more information is available in the speech signal
ATAROS Corpus

- High-quality audio
- 34 dyads from Pacific Northwest
  - Strangers matched by age
- 5 stance-dense collaborative tasks
- 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>Map</td>
<td>Inventory</td>
<td></td>
</tr>
<tr>
<td>Category</td>
<td>Survival</td>
<td></td>
</tr>
<tr>
<td>Budget items</td>
<td>Budget</td>
<td></td>
</tr>
</tbody>
</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)
  – Aligns word and phone boundaries with audio

• Manual stance annotation
  – Identify and label “stancey” expressions via content analysis (modified from Freeman 2014)
Annotation

• Stance strength
  – None
  – Weak
  – Moderate
  – Strong

• Polarity
  – Positive
  – Negative
  – Neither/neutral

• Stance act types, e.g.:
  – Offer, solicit, accept, reject opinion
  – Persuasion, hedging, reluctance
  – Rapport-building
  – Backchannels
Predictions

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

- Variation by task
  - Style, involvement

- Variation by sex/gender
  - Speaker and/or interlocutor
## Dyads (Sample)

<table>
<thead>
<tr>
<th>Group</th>
<th>Ages</th>
<th>Dyads by sex</th>
<th>Sums</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>FF MM MF</td>
<td></td>
</tr>
<tr>
<td>Younger</td>
<td>(18-32)</td>
<td>3 1 6</td>
<td>10</td>
</tr>
<tr>
<td>Middle</td>
<td>(38-49)</td>
<td>1 1 3</td>
<td>5</td>
</tr>
<tr>
<td>Older</td>
<td>(60-75)</td>
<td>3 1 1</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>7 3 10</td>
<td>20</td>
</tr>
</tbody>
</table>

Total: F: 24  M: 16
Measures

• Between tasks
  – Task duration, spurts/speaker, spurt length, speaking rate
    • Spurt: speech of a speaker between >500ms pauses
    • Rate in vps (vowels/sec, proxy for syllables/sec)

• Within dyad
  – Stance acts by type
    • Stance act: speech act involving stance
## Task Differences

<table>
<thead>
<tr>
<th>Measure (means)</th>
<th>Inventory</th>
<th>Budget</th>
<th>signif.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task duration (min)</td>
<td>12.5</td>
<td>13.6</td>
<td>ns</td>
</tr>
<tr>
<td>Spurts/speaker (n)</td>
<td>154</td>
<td>142</td>
<td>ns</td>
</tr>
<tr>
<td>Spurt length (words)</td>
<td>5.7</td>
<td>7</td>
<td>p &lt; 0.001</td>
</tr>
<tr>
<td>Speaking rate (vps)</td>
<td>F 3.3</td>
<td>3.8</td>
<td>p &lt; 0.001</td>
</tr>
<tr>
<td></td>
<td>M 3.9</td>
<td>4.0</td>
<td>ns</td>
</tr>
</tbody>
</table>

- Faster speech, longer utterances = higher involvement in Budget task
Task & Speaker Sex

- Spurts longer in Budget
- Effect greater for men
- Speaking rate: women speak more slowly in Inventory
Speaker & Partner Sex

- Longer spurts when talking to men
  - Women with male partners (both tasks)
  - Men with male partners (Budget only)

<table>
<thead>
<tr>
<th></th>
<th>Speaker</th>
<th>Partner</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>F</td>
</tr>
<tr>
<td>Inventory</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Budget</td>
<td>7</td>
<td>9</td>
</tr>
</tbody>
</table>

Spurt length

Length (words)
Speaker & Partner Sex

- Faster speaking rates in same-sex groups
  - Women with female partners (both tasks)
  - Men with male partners (both tasks)
Stance Types within Dyad

• Frequent act types
  – Offer opinion, Agree, Convince (w/ reasons)
    • total 45%-65% of acts within each dyad

• Infrequent
  – Solicit opinion, Rapport-build, Soften opinion
    • total 6%-23% of acts within dyad

• Very infrequent
  – Disagree, Reluctance, Backchannel
    • total 1%-9% of acts within each dyad
Stance Types within Dyad

• Some types may have a reciprocating effect
  – Partners use similar numbers of acts
    • Rapport-building
    • Disagreement
    • Backchannels
  – Especially in same-sex dyads
R² = 0.47
R² = 0.83
R² = 0.53

Female speaker 2
Female speaker 1
FF

R² = 0.11
R² = 0.30
R² = 0.62

Female speaker
Male speaker
MM

R² = 0.89
R² = 0.58
R² = 0.80

Male speaker 2
Male speaker 1

R² = 0.89
R² = 0.58
R² = 0.80

Male speaker 2
Male speaker 1

R² = 0.11
R² = 0.30
R² = 0.62

Female speaker
Male speaker
MF

R² = 0.89
R² = 0.58
R² = 0.80

Male speaker 2
Male speaker 1

R² = 0.89
R² = 0.58
R² = 0.80

Male speaker 2
Male speaker 1

R² = 0.11
R² = 0.30
R² = 0.62

Female speaker
Male speaker
MF

R² = 0.11
R² = 0.30
R² = 0.62

Female speaker
Male speaker

# of Acts w/in Dyad
Conclusion

• Utterance length & speaking rate
  – Task effects (~style/involvement)
  – Gender effects within each task

• Stance types
  – Reciprocal effects in same-sex groups

• Many avenues for future work…
  – Age, power, rapport dynamics
  – Record friends, cross ages, change partner gender
References


Thanks

• Support: NSF IIS 1351034; NIH R01 DC60014; UW Excellence in Linguistic Research Graduate Award

• PhLEGMe members (Indiana University phonetics group)

• The ATAROS team (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
  – Info/corpus access: depts.washington.edu/phonlab/projects.htm
  – My contact: vdfreema@iu.edu