Persuasion of the Undecided: Language vs. the Listener

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Examining Language Effects in Persuasion

**Research Goal:** explore the linguistic factors that determine and define persuasive arguments
Prior Work in NLP on Persuasion

Pre- and post-debate vote outcomes of IQ2 debates (Zhang et al., 2016)

Before the debate

After the debate
Prior Work in NLP on Persuasion

Individual-level vote outcome prediction, considering audience characteristics (Durmus and Cardie, 2018)
Prior Work in Social and Political Science

2005 British general election
Undecided voters are more susceptible to campaign persuasion
(Kosmidis and Xezonakis, 2010)

2008, 2012 U.S. presidential debates
Critical portion of debate to undecided voters are content-rich statements
(Schill and Kirk, 2014)

European election campaigns
Affiliated voters adjust positions based on subjective perceptions of campaigns
(Adams et al., 2011)

Key difference in the persuasion of undecided and decided audience members
Research Question

What language features are important for persuasion?

Do these features differ for individuals who are persuaded from the middle versus persuaded from the opposing side?
Hypothesis

- The important linguistic features for persuasion differ between a priori undecided and a priori decided audience members
- Audience features provide important context
Dataset

Dataset of online debates (Durmus and Cardie, 2018)

- Collection of ~67k debates from Debate.org
- User information for ~36k users
- Varied debate topics (i.e. Politics, Religion, Movies, Science, etc.)
**Dataset**

**Example user profile**

| Dataset |  |
|---------|--|
| **Online:** | 1 Year Ago |
| **Updated:** | 9 Years Ago |
| **Joined:** | 10 Years Ago |
| **President:** | Not Saying |
| **Ideology:** | Conservative |
| **Party:** | Republican Party |
| **Relationship:** | Married |
| **Gender:** | Female |
| **Education:** | Bachelors Degree |
| **Ethnicity:** | White |
| **Income:** | Not Saying |
| **Occupation:** | Self-Employed |
| **Religion:** | Christian |

**46-year old female**

**The Big Issues**

- Gay Marriage: Con
- Global Warming Exists: Con
- Abortion: Con
- Affirmative Action: Con
- Civil Unions: Pro
- Death Penalty: Pro

...
### Example user profile

**Dataset**

| Attribute          | Value         |
|--------------------|---------------|
| **Online:**        | 1 Year Ago    |
| **Updated:**       | 9 Years Ago   |
| **Joined:**        | 10 Years Ago  |
| **President:**     | Not Saying    |
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| **Relationship:**  | Married       |
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**The BIG Issues**

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...
### Dataset

**Example debate titled “HATE SPEECH LAWS ARE A GOOD IDEA”**

| ROUND 1 | PRO: | CON: |
|---------|------|------|
|         | this reason, you are not free to make threats or defamatory statements against another person in both ... | laws violate the fundamental freedom of speech which democracy is founded upon ... |

| ROUND 2 | PRO: | CON: |
|---------|------|------|
|         | has ignored my point about hate speech breeding an “us vs them” mentality, and how such perceptions ... | question is, does our government have the right to tell us what our opinions are, and to define what is ... |

| ROUND 3 | PRO: | CON: |
|---------|------|------|
|         | as evidenced by the rise in violence against Hispanics and Muslims I cited in my second round, hate speech ... | courts to be able to decide which opinions are “moral” and which are not? How fascist do we get here? ... |
## Dataset

### Vote Here

| Question                                      | Pro | Tied | Con |
|-----------------------------------------------|-----|------|-----|
| Who did you agree with **before** the debate? |     |      |     |
| Who did you agree with **after** the debate?  |     |      |     |

User votes on debates
Experimental Approach

1. Build a classifier to predict persuasion vote outcomes
   ○ Prediction task: Given an individual voter, predict which debater/side (PRO or CON) the voter will be convinced by after the debate
2. Examine what features are most important for prediction accuracy
Distinct Cases of Persuasion

Voter 1

Before the debate
- PRO
- CON
- UNDECIDED

After the debate
- PRO
- CON
- UNDECIDED

Case 1: FROM-MIDDLE

Voter 2

Before the debate
- PRO
- CON
- UNDECIDED

After the debate
- PRO
- CON
- UNDECIDED

Case 2: FROM-OPPOSING
Experimental Approach

Divide the dataset into two subsets:

Dataset

Examples

- from-middle
- from-opposing
- ...
- from-opposing
- from-middle
- ...

features

model

prediction

features

model

prediction
Experimental Approach

Divide the dataset into two subsets:
Predictive Model

- Audience Features
- Linguistic Features

Logistic Regression Classifier

PRO

CON
Audience Features

- gender
- matching ideology
- opinion similarity
- decidedness
- persuadability
Audience Features

- gender
- matching ideology
- opinion similarity
- decidedness
- persuadability

Example user profile and corresponding feature encodings
## Linguistic Features

| Lexical Features   | Style Features         | Semantic Features         | Argumentation Features      |
|--------------------|------------------------|---------------------------|----------------------------|
| TF-IDF             | length                 | sentiment                 | assessment                 |
| modal verbs        | personal pronouns      | subjectivity              | empathy                    |
| swear words        | referring to opponent  | connotation               | authority                  |
| spelling errors    | use of citations       | politeness                | inconsistency              |
| punctuation        | links                  |                           | necessity                  |
|                    |                        |                           | contrasting                |
|                    |                        |                           | possibility                |
|                    |                        |                           | emphasizing                |
|                    |                        |                           | priority                   |
|                    |                        |                           | generalizing               |
|                    |                        |                           | rhetorical questions       |
|                    |                        |                           | desire                     |
|                    |                        |                           | difficulty                 |
# Results: Audience vs Linguistic Features

| Accuracy of Model                  | FROM-MIDDLE | FROM-OPPOSING |
|-----------------------------------|-------------|---------------|
| Majority Baseline                 | 57.43%      | 59.42%        |
| All Features                      | **69.01%**  | **67.22%**    |
| Audience Features Only            | 61.47%      | 61.54%        |
| Linguistic Features Only          | 66.95%      | 66.65%        |

**Result:** Linguistic features are more important for predictive accuracy.
## Results: Best-Performing Feature Sets

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| All Features                      | 69.01%      | 67.22%        |
| Audience Features Only            | 61.47%      | 61.54%        |
| Linguistic Features Only          | 66.95%      | 66.65%        |
| Best-performing Features          | **69.17%**  | **68.21%**    |

**Result:** not all linguistic features are helpful in predictive accuracy
### Results: Best-Performing Feature Sets

| FROM-MIDDLE | Features Not In Set |
|-------------|---------------------|
|             | use of citations    |
|             | referring to opponent|
|             | swear words         |

| FROM-OPPOSING | Features Not In Set |
|---------------|---------------------|
|               | subjectivity        |
|               | modals              |
|               | bi-/tri-gram TF-IDF|
Conclusion

- **Key Result:** Linguistic feature differences correspond to rhetorical styles found to be effective on undecided and decided audiences.

- **Key Takeaway:** the importance of studying undecided and decided audiences separately.
End

For questions and suggestions, email lfl42@cornell.edu

Thank you!