

Why Can't You Convince Me?

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Argumentation Mining

- Traditionally concerned with determining the **argumentative** structure of a text document
 - identifying its claims and premises and the relationships between them
- Recently expanded to tasks concerning the **persuasiveness** of arguments
 - **Focus:** **how** persuasive is your argument?

Example Argument [<http://idebate.org>]

Motion

This House would ban teachers from interacting with students via social networking websites.

Assertion

Acting as a warning signal for children at risk.

Justification

If a child is aware that private electronic contact between teachers and students is prohibited by law, the child will immediately know the teacher is doing something he is not supposed to if he initiates private electronic contact. This will therefore act as an effective warning sign to the child.

Example Argument [<http://idebate.org>]

Motion: expresses a stance on the debate's topic

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Example Argument [<http://idebate.org>]

Motion

This House would ban teachers from interacting with students via social networking websites.

Assertion: expresses why author agrees or disagrees with motion

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Humans can easily determine that this argument is not persuasive

Determining Argument Persuasiveness

- Researchers have begun work on automatically scoring an argument's persuasiveness (low score → not persuasive)
- But... it's equally important to determine **why** an argument is not persuasive
 - Could help an author understand which aspect of her argument needs improvement

Goal

- Understand why an argument is weak by:
 1. **defining the errors** that negatively impact the persuasiveness of an argument
 2. **hand-annotating a corpus** of arguments, each of which is annotated with errors and persuasiveness score
 3. **training models** for predicting an argument's errors and persuasiveness score

Plan for the Talk

- Errors that negatively impact argument persuasiveness
- Corpus and annotation
- Model training
- Evaluation

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Five Errors

- motivated by theoretical work on argument persuasiveness

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- motivated by theoretical work on argument persuasiveness
- **Grammar Error (GE)**
 - **Motivation:** grammar errors can interrupt the flow of discourse in an argument and reduce its coherence
 - 1 if argument is hard to understand because of grammar errors
 - 0 otherwise

Five Errors

- motivated by theoretical work on argument persuasiveness
- **Grammar Error (GE)**
- **Lack of Objectivity (LO)**
 - **Motivation:** An argument is less persuasive if an author flatly states her personal opinions as evidence for her claim
 - 1 if it displays an inappropriate lack of objectivity
 - 0 otherwise

Five Errors

- motivated by theoretical work on argument persuasiveness
- **Grammar Error (GE)**
- **Lack of Objectivity (LO)**
- **Inadequate Support (IS)**
 - **Motivation:** arguments with more support tend to be more persuasive
 - 2 if support is missing
 - 1 if support is inadequate
 - 0 if support is adequate

Five Errors

- motivated by theoretical work on argument persuasiveness
- **Grammar Error (GE)**
- **Lack of Objectivity (LO)**
- **Inadequate Support (IS)**
- **Unclear Assertion (UA)**
 - **Motivation:** failure to clearly state the assertion makes an argument less persuasive
 - 2 if assertion is incomprehensible w/o reading the justification
 - 1 if unclear how assertion is related to motion w/o justification
 - 0 if assertion is clear

Five Errors

- motivated by theoretical work on argument persuasiveness
- **Grammar Error (GE)**
- **Lack of Objectivity (LO)**
- **Inadequate Support (IS)**
- **Unclear Assertion (UA)**
- **Unclear Justification (UJ)**
 - **Motivation:** failure to state an argument's justification for its assertion will make it less persuasive
 - 2 if justification appears unrelated to assertion
 - 1 if justification does not concisely justify the assertion
 - 0 if justification is clear

Plan for the Talk

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Corpus and Annotation

- **Corpus**

- debates from International Debate Education Association website
 - cover a wide range of topics (politics, economics, science, ...)
- 1208 arguments randomly selected from 165 debates

- **Annotation**

- two native English speakers annotated each argument with its persuasiveness score and the five errors, if applicable

Rubric for Scoring Persuasiveness

- 6:** a very persuasive argument
- 5:** a persuasive, or only pretty clear argument
- 4:** a decent, or only fairly clear argument
- 3:** a poor, or only most understandable argument
- 2:** a very unpersuasive or very unclear argument
- 1:** an unclear or missing argument

Plan for the Talk

- Errors that negatively impact argument persuasiveness
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- **Model training**
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Model Training

- Cast the task of predicting an argument's errors and its persuasiveness scores as **six independent linear SVM regression problems**
 - For each of the six problems, we create one training instance from each argument in training set
 - label is the argument's gold score for that problem
 - represented by 11 features

11 Features

- # grammar errors per sentence in justification
 - Detected using the LanguageTool proofreading program
 - Useful for predicting grammar errors

11 Features

- # grammar errors per sentence in justification
- # subjectivity indicators in justification
 - Encodes the frequencies of “morally”, “certain”, “perhaps”
 - Arguments too concerned with the author’s morality or in which the author seems too certain of herself display a lack of objectivity

11 Features

- # grammar errors per sentence in justification
- # subjectivity indicators in justification
- # definite articles in justification
 - An argument with few definite articles usually lacks indicators of specificity and may also be too subjective

11 Features

- # grammar errors per sentence in justification
- # subjectivity indicators in justification
- # definite articles in justification
- # 1st person plural pronouns in justification
 - Justifications that lack objectivity often rely on stories about the author's personal experiences

11 Features

- # grammar errors per sentence in justification
- # subjectivity indicators in justification
- # definite articles in justification
- # 1st person plural pronouns in justification
- # citations in justification
 - More citations tend to imply more support for claims

11 Features

- # grammar errors per sentence in justification
- # subjectivity indicators in justification
- # definite articles in justification
- # 1st person plural pronouns in justification
- # citations in justification
- Assertion length
 - short assertions could be unclear
- Justification length
 - short justifications could be unclear

11 Features

- # grammar errors per sentence in justification
- # subjectivity indicators in justification
- # definite articles in justification
- # 1st person plural pronouns in justification
- # citations in justification
- Assertion length
- Justification length
- # content lemmas only in justification: enough points/support?
- # content lemmas only in assertion: encodes relevance to justification
- # strong thesis statements in justification: makes justification clearer
- # subject matches in discourse relation

Plan for the Talk

- Errors that negatively impact argument persuasiveness
- Corpus and annotation
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- Evaluation

Evaluation: Goal

- Evaluate our approach to error and persuasiveness prediction

Three Scoring Metrics

- **E (Zero-one Loss):**
 - frequency at which a system predicts the wrong score
- **ME (Mean Error):**
 - mean distance between the predicted score and the gold score
- **PC (Pearson's Correlation Coefficient):**
 - Pearson's correlation between the predicted and gold scores

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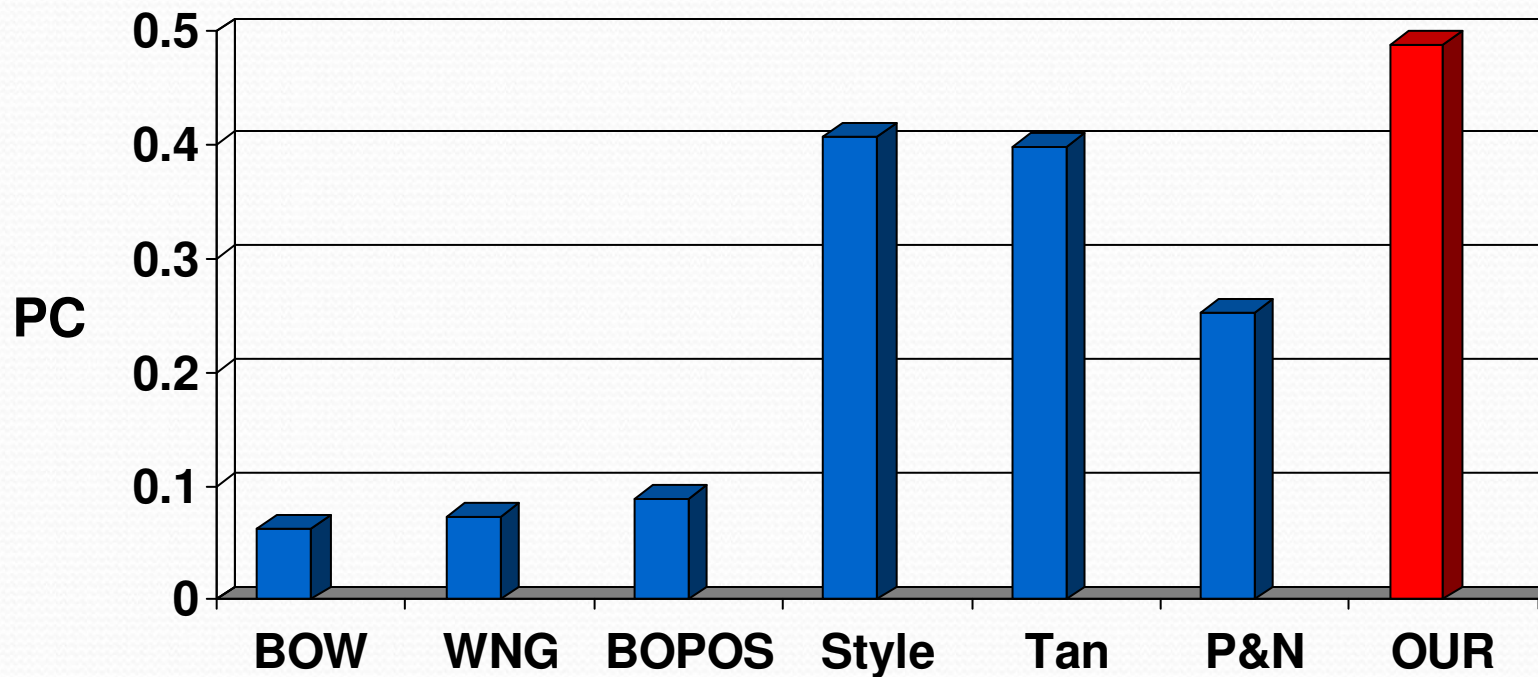
Six Baseline Systems

- differ from our approach only w.r.t. the features used
- **Bag of words (BOW)**
- **Word n-grams (WNG)**
 - unigrams, bigrams, trigrams
- **Bag of part-of-speech tags (BOPOS)**
- **Style**
 - length, word categories, word complexity, word scores
- **Duplicated Tan et al. (2016)**
 - features for predicting success of persuasion
- **Persing and Ng (2015)**
 - features developed for scoring essay persuasiveness

Evaluation: Setup

- 5-fold cross validation

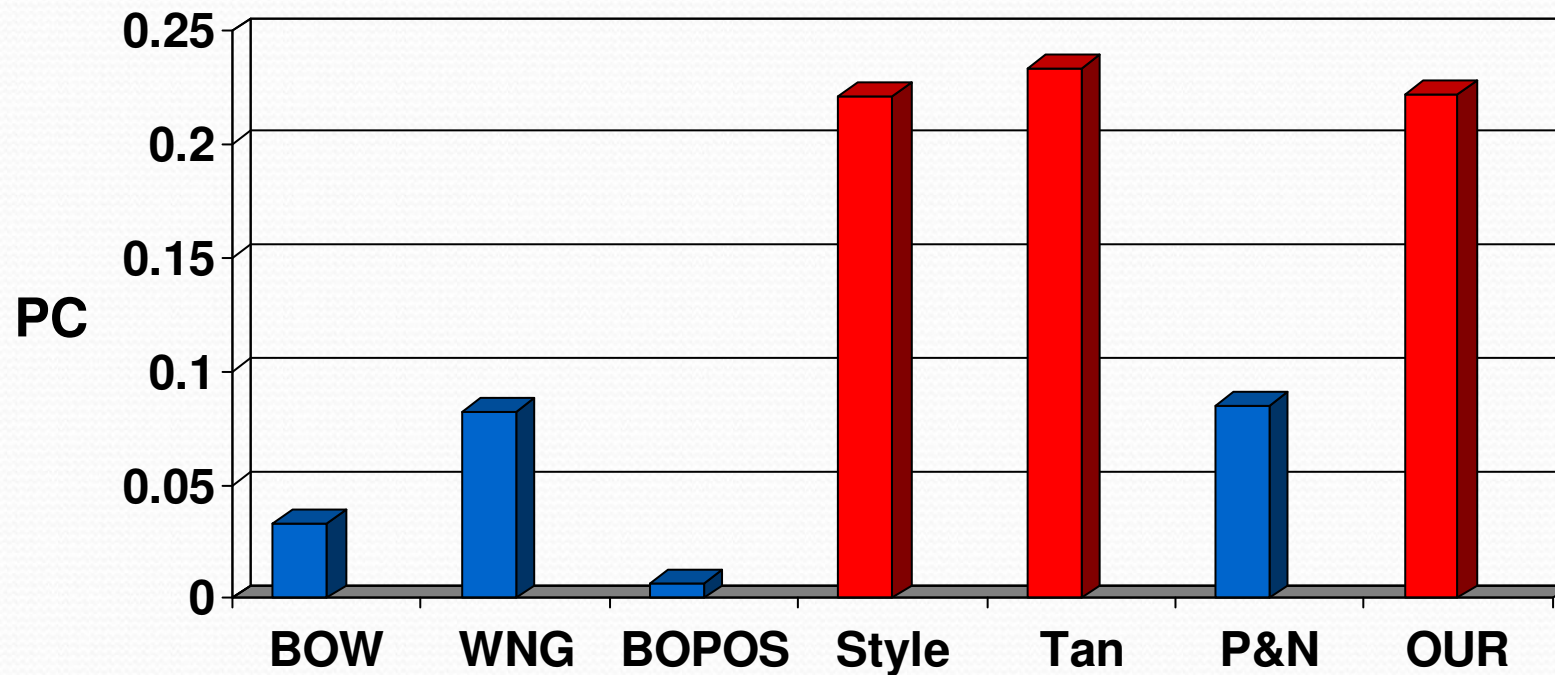
Results: Argument Persuasiveness



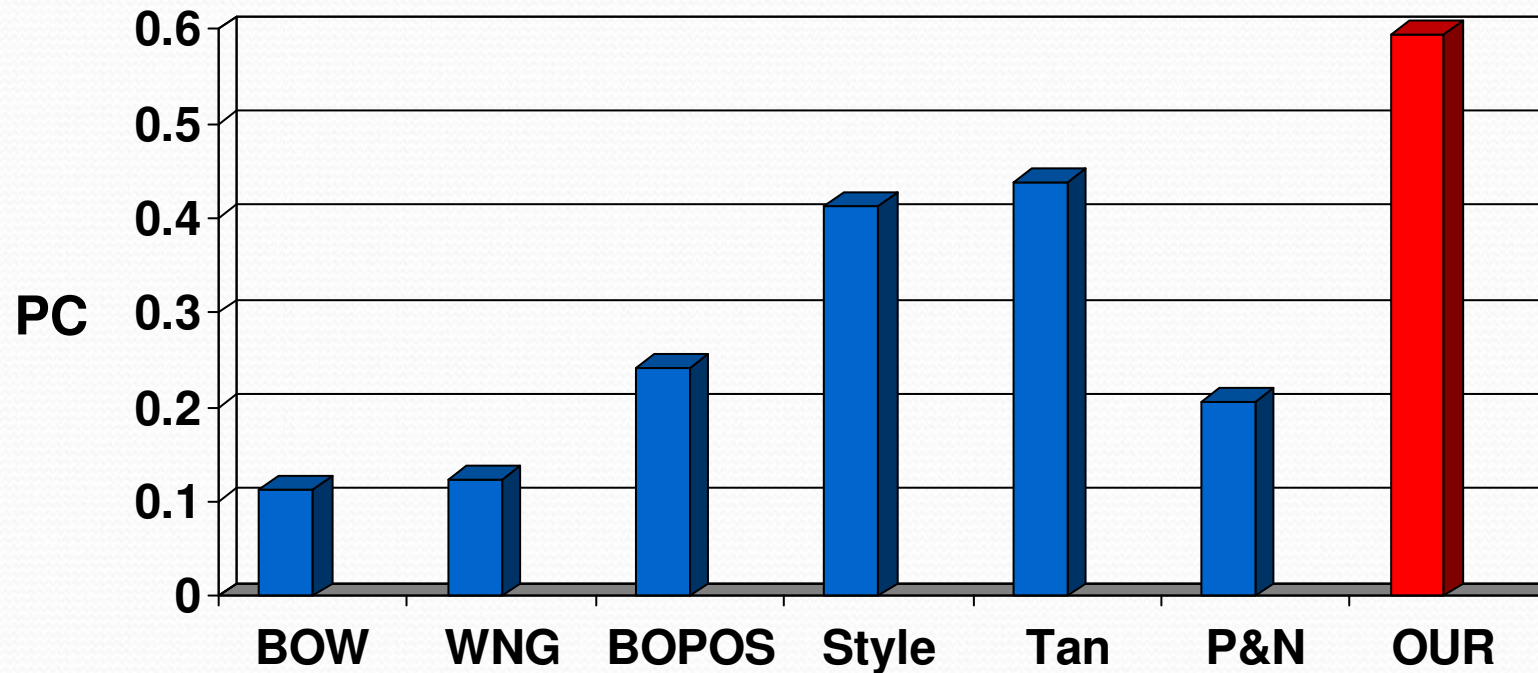
Results: Grammar Errors



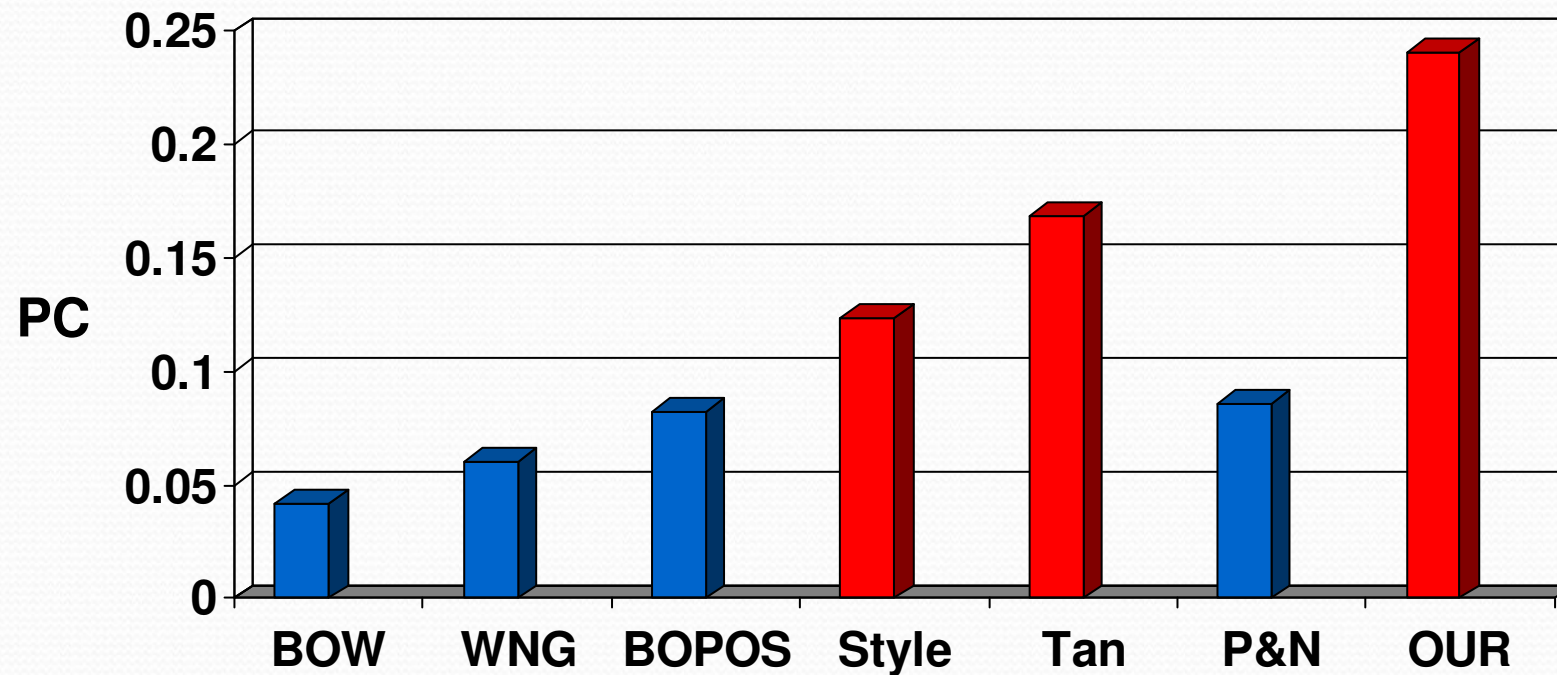
Results: Lack of Objectivity



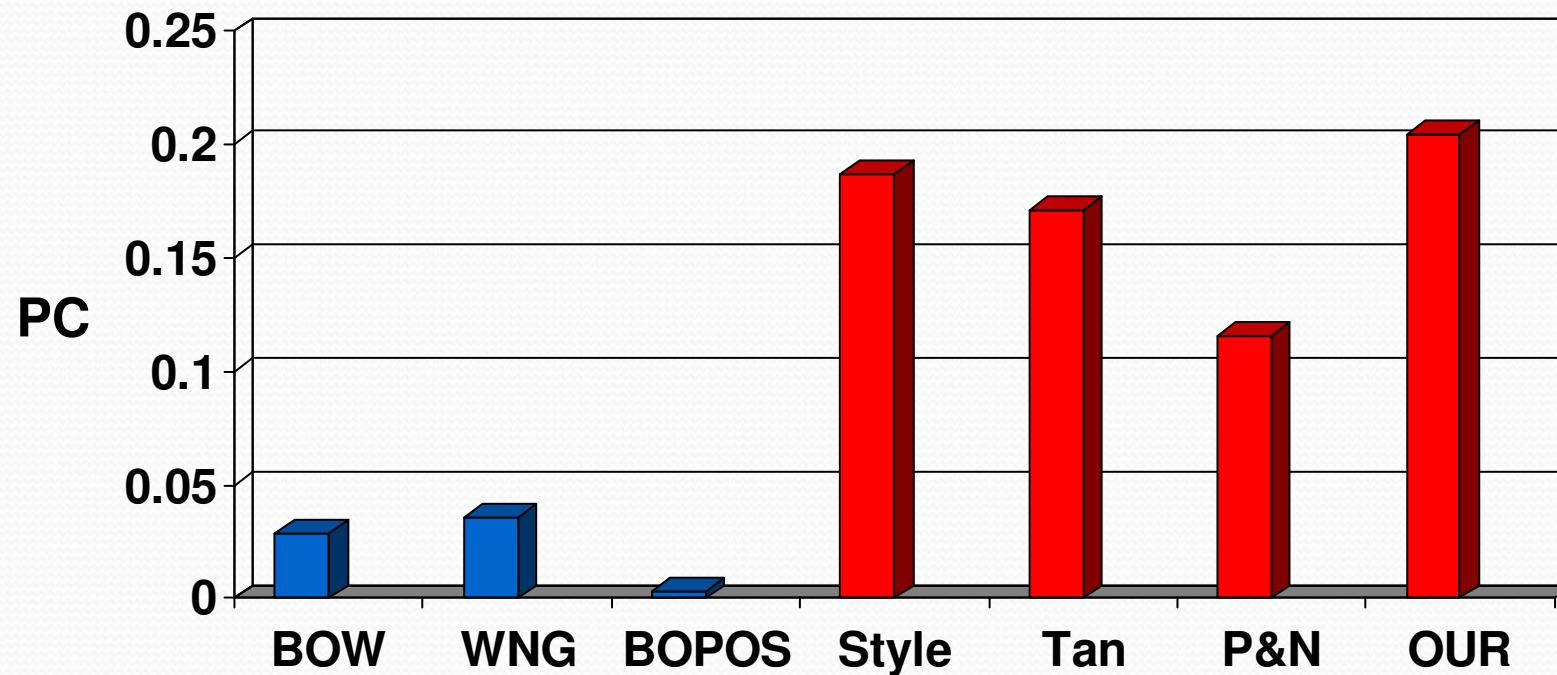
Results: Inadequate Support



Results: Unclear Assertion



Results: Unclear Justification

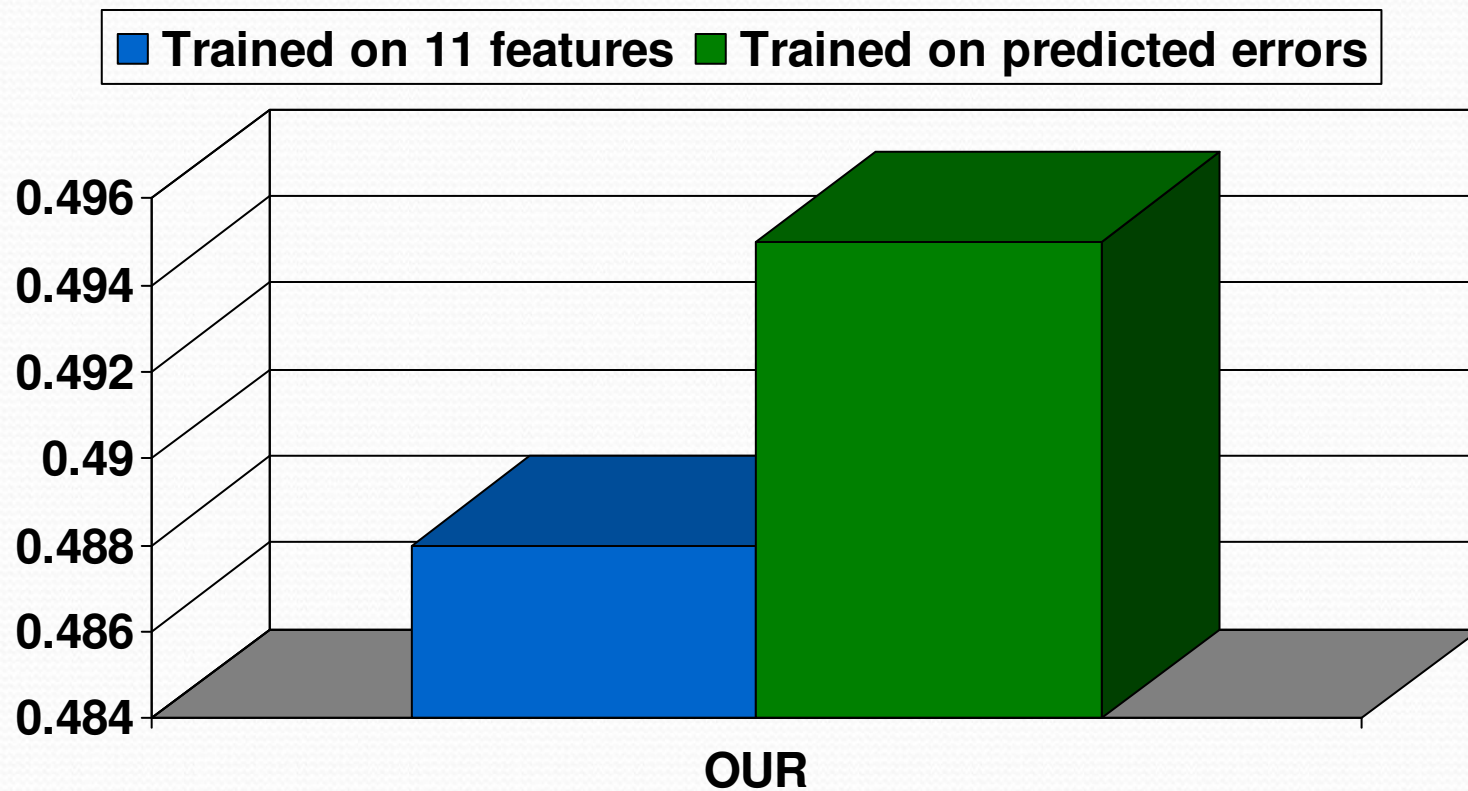


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- Overall, our system performs no worse than the best baseline for each prediction task

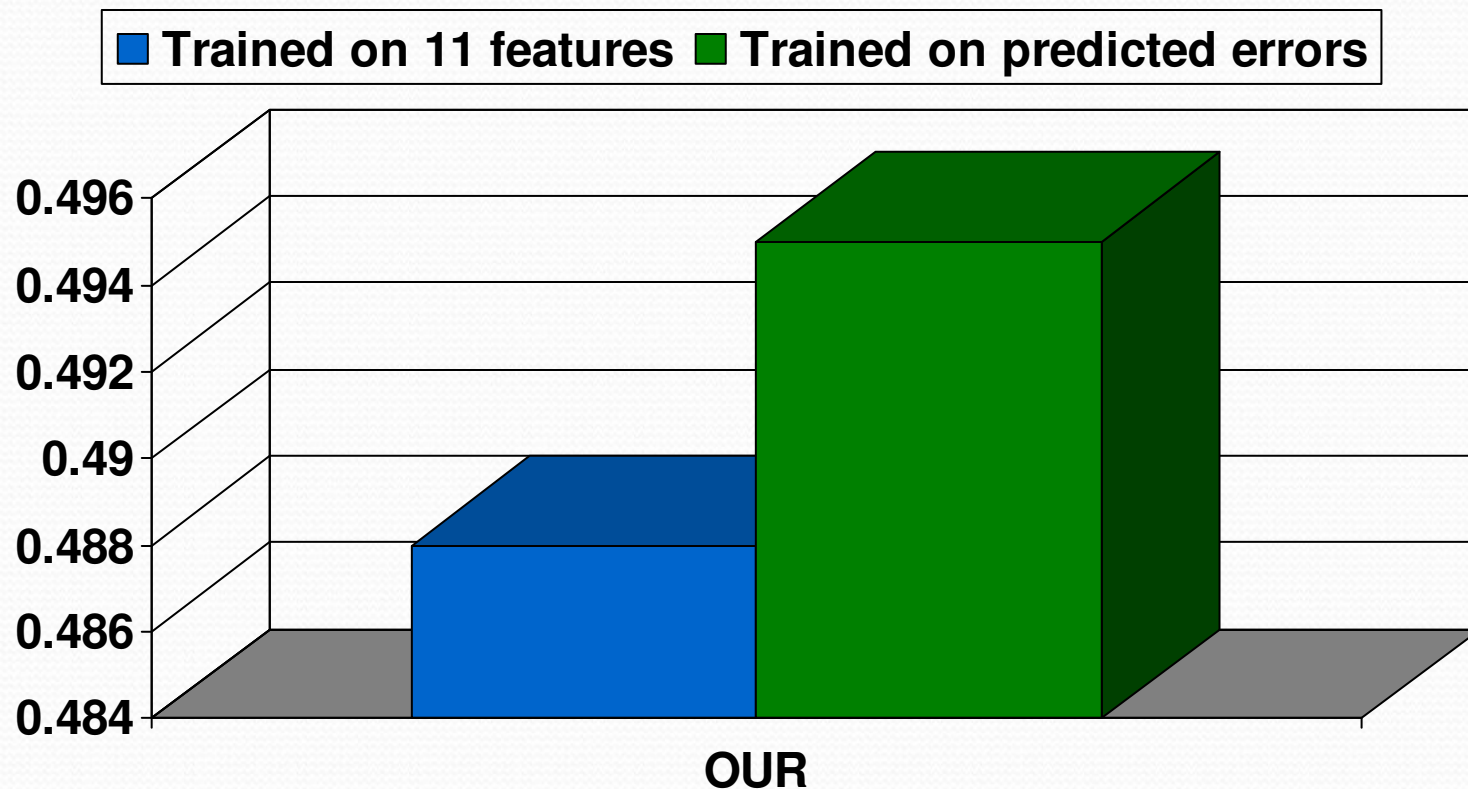
But... we shouldn't be satisfied

- Persuasiveness was predicted independently of the errors
 - It's possible that no errors are identified in an argument that is predicted to be unpersuasive
 - defeats our goal of helping a user understand why her argument is not persuasive
- So...**how well can the predicted errors score persuasiveness?**
 - Use the 5 predicted errors (rather than the 11 features) to train a support vector regressor to predict persuasiveness scores

Predicting Persuasiveness



The predicted errors, when used as features for training a regressor, can score persuasiveness even better than the 11 features



Summary

- Examined the task of modeling errors in unpersuasive arguments
- Presented models for predicting errors and persuasiveness that outperformed competing baselines
- Made our annotated corpus publicly available