Analysis of Counseling Conversations

Althoff, Clark, Leskovec

Why did I choose this paper?

1. Psycholinguistics
2. Sociolinguistics
3. Big data
4. Mental health

Why did I choose this paper?

- Methodology
- Diversity of experiments
- Question-based organization
- Density
- Detail-orientedness
- Depth
- Simplicity
- (Very) Well-written

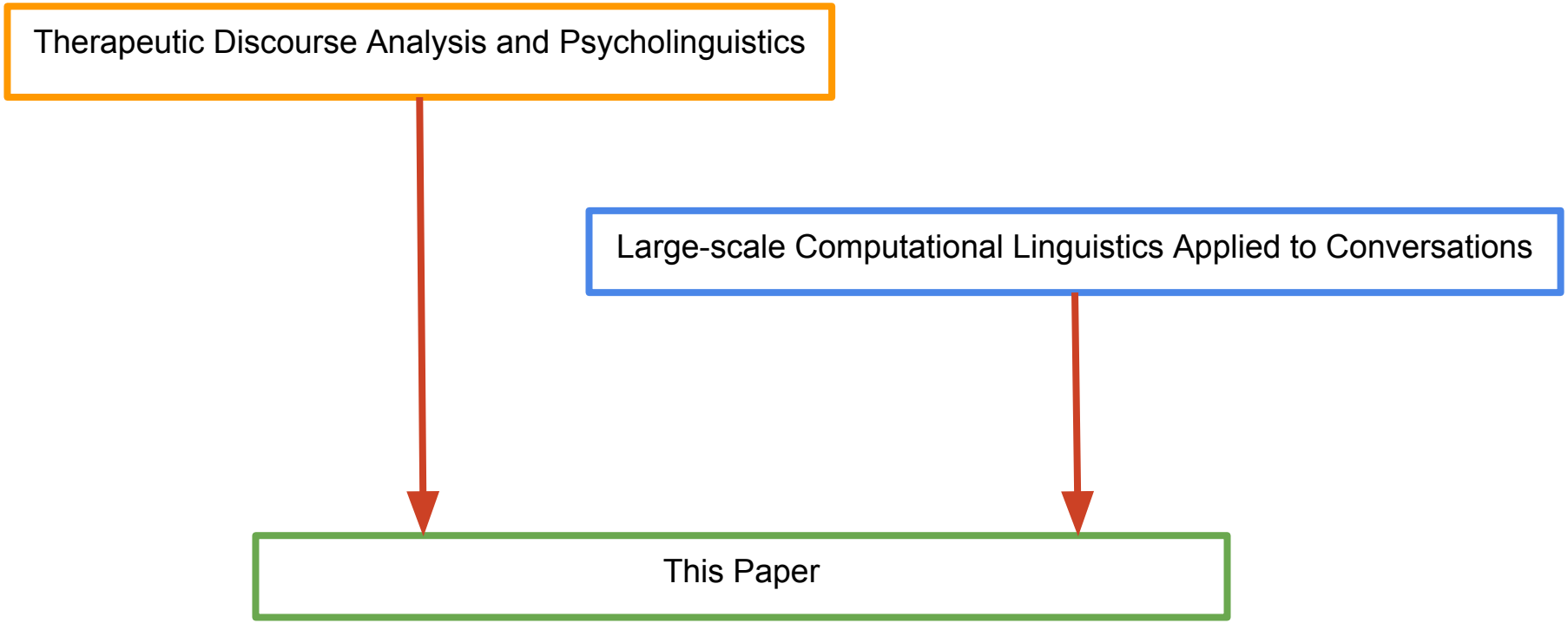
Importance

- One of the only two TACL papers in sociolinguistics (so far)
  - Other one on formality analysis (Pavlick and Tetreault, 2016)
- Computational sociolinguistics is catching up!
  - Corollary: Yes, you can write a TACL paper too.
- Jure Leskovec (moved from graphs to social graphs to sociolinguistics)
- Action Editor: Lillian Lee
  - Computational Sociolinguistics veteran (Sentiment Analysis, …)
  - Regina Barzilay's postdoc advisor

Motivation

- Mental illness is a global health issue.
  - 43.6 M adults in US per year (only reported incidents).
- Family, friends, communities are affected.
- Treatable by psychotherapy and counseling.
- Counseling conversations have not been rigorously analyzed.
  - Previous studies are mostly qualitative, and/or work with small data.

Genesis


Therapeutic Discourse Analysis and Psycholinguistics
Large-scale Computational Linguistics Applied to Conversations
This Paper

Dataset

http://www.crisistextline.org/open-data/

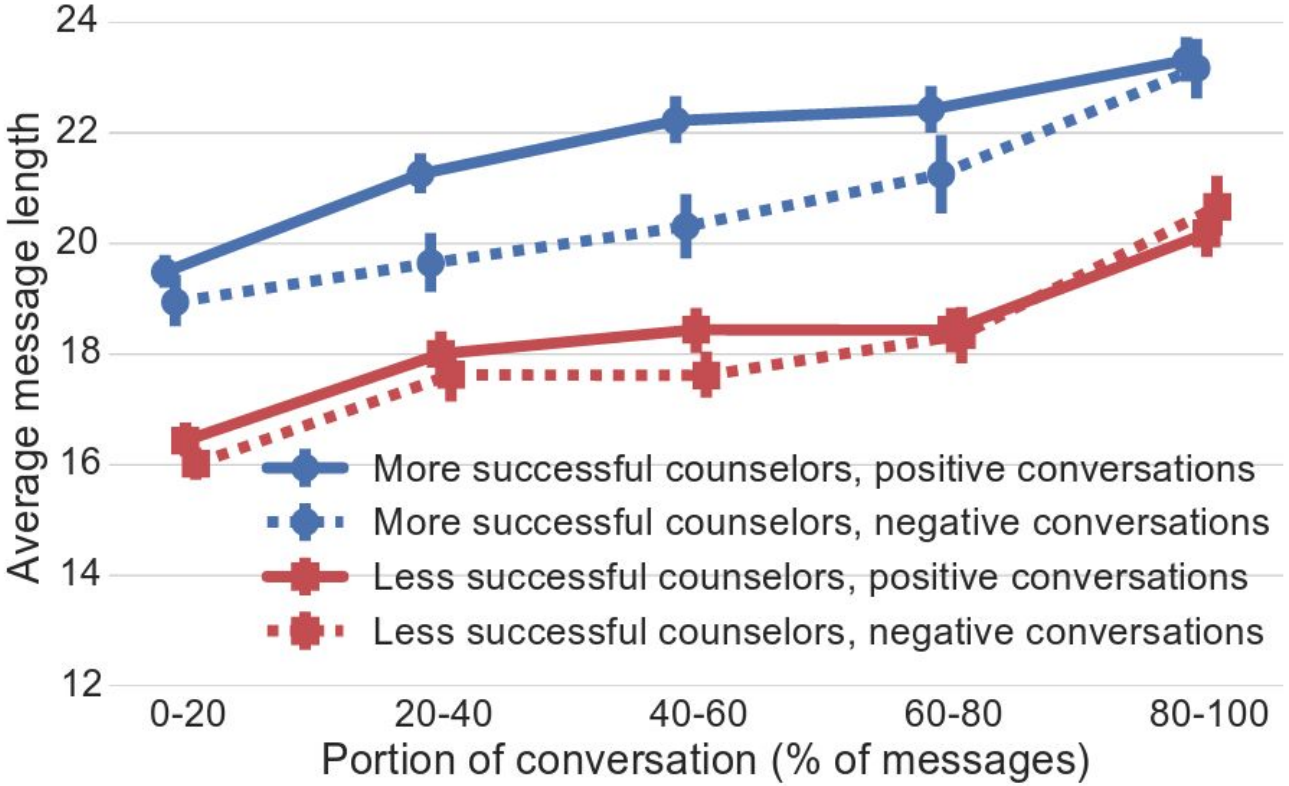
Statistics

Conversations	80,885
Conversations with survey response	15,555 (19.2%)
Messages	3.2 M
Messages with survey response	663,026 (20.6%)
Counselors	408
Messages per conversation*	42.6
Words per message*	19.2

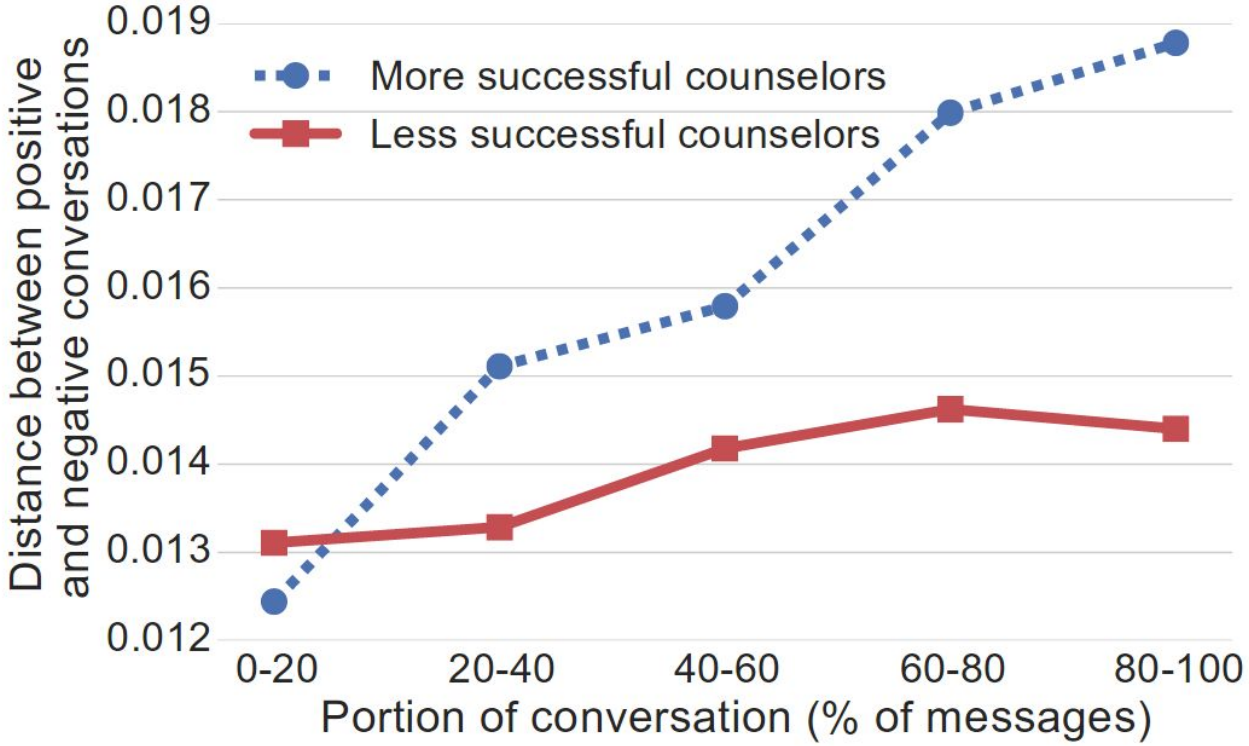
Data richness

	NA	Depressed	Relationship	Self harm	Family	Suicide	Stress	Anxiety	Other
Success rate	0.556	0.612	0.659	0.672	0.711	0.573	0.696	0.671	0.537
Frequency	0.200	0.200	0.089	0.074	0.071	0.063	0.041	0.039	0.035
Frequency with more successful counselors	0.203	0.199	0.089	0.067	0.072	0.061	0.048	0.042	0.030
Frequency with less successful counselors	0.223	0.208	0.087	0.070	0.067	0.056	0.030	0.032	0.028

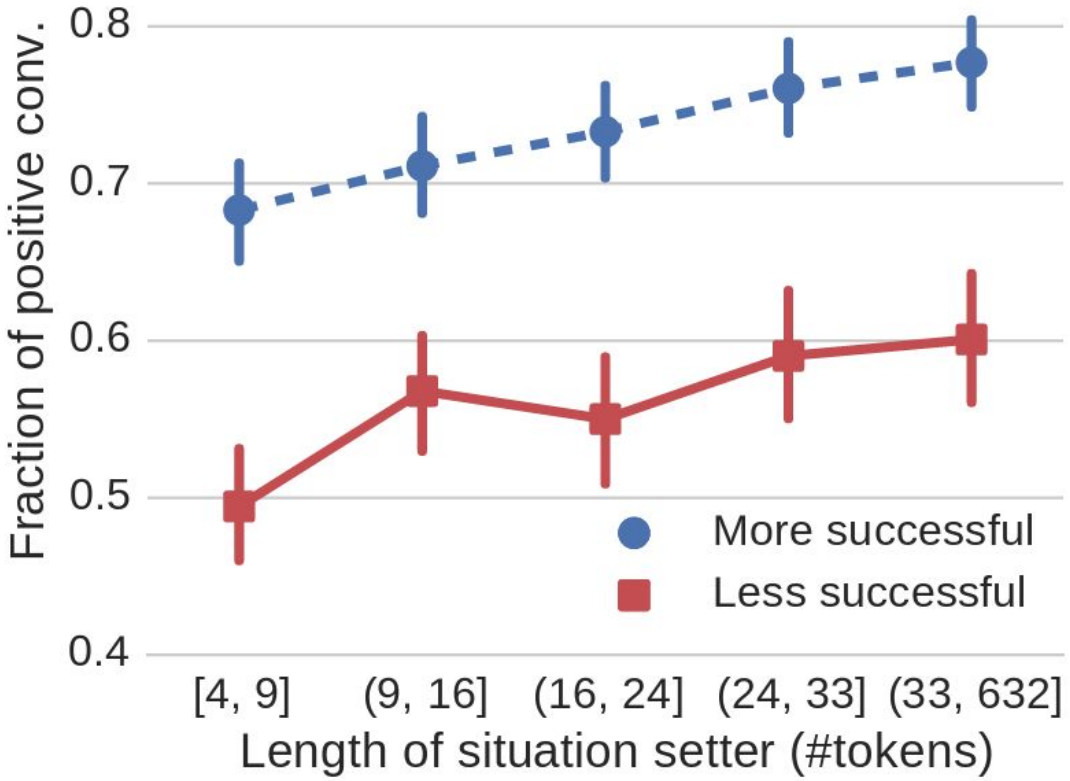
Counseling Quality



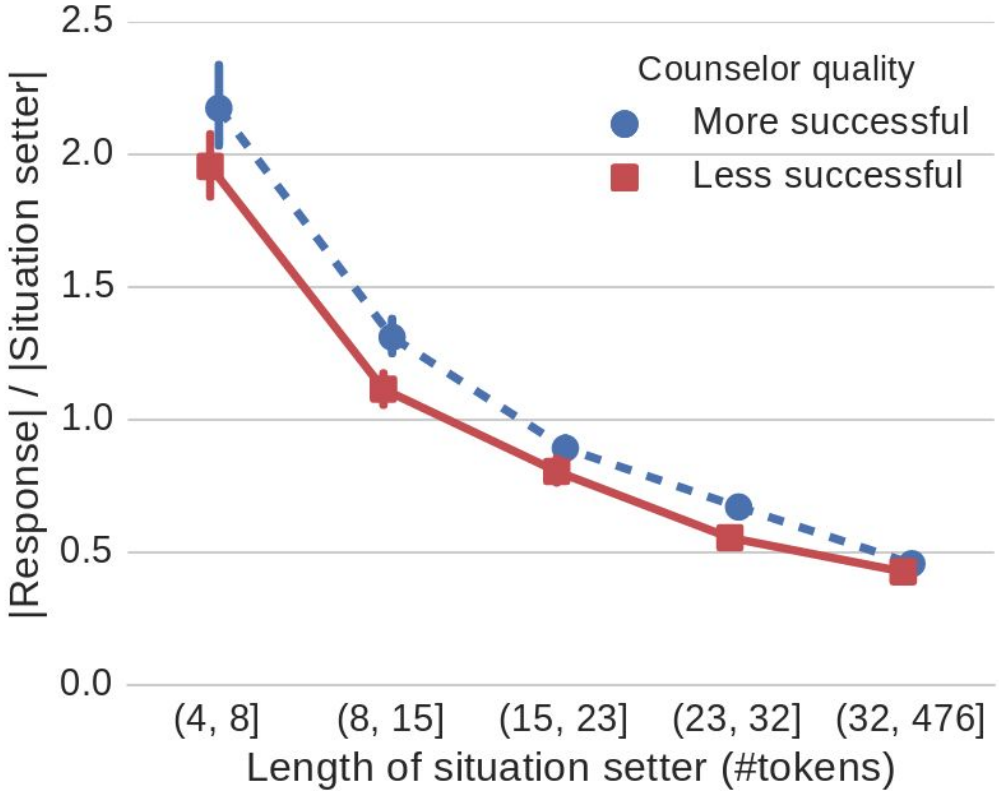
Counselor Adaptability



Reacting to Ambiguity



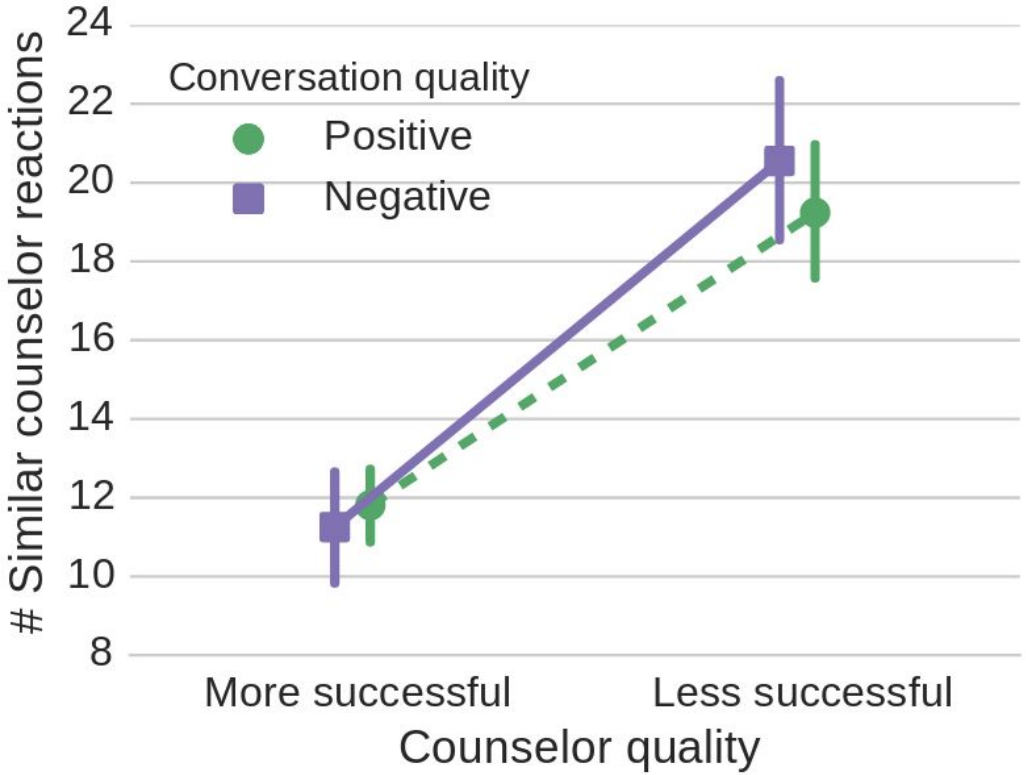
Reacting to Ambiguity



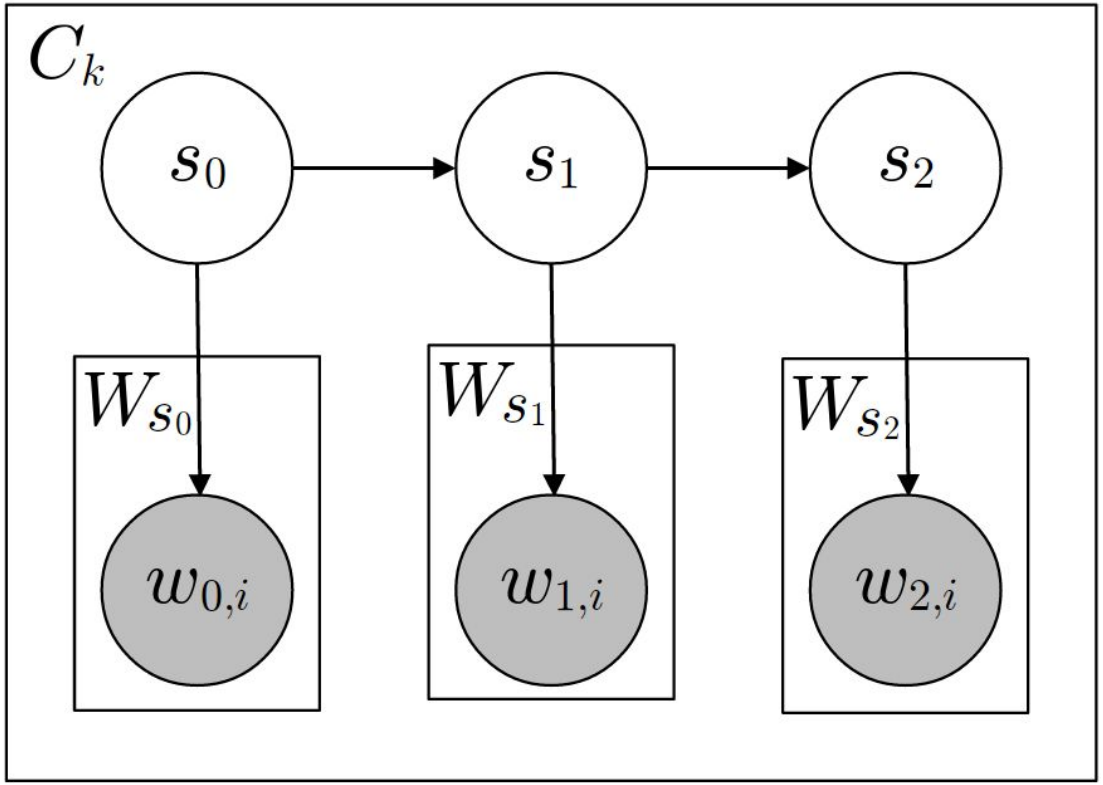
Responding to Ambiguity

	More S.	Less S.	Test
% conversations successful	70.7	51.7	***
#messages in conversation	57.0	46.7	***
Situation setter length (#tokens)	12.1	10.7	***
C response length (#tokens)	15.8	11.8	***
T response length (#tokens)	20.4	18.8	***
% Cosine sim. C resp. to context	11.9	14.8	***
% Cosine sim. T resp. to context	7.6	7.3	–
% C resp. w check question	12.6	4.1	***
% C resp. w suicide check	13.5	10.3	***
% C resp. w thanks	6.3	2.4	***
% C resp. w hedges	41.4	36.8	***
% C resp. w surprise	3.3	2.8	–

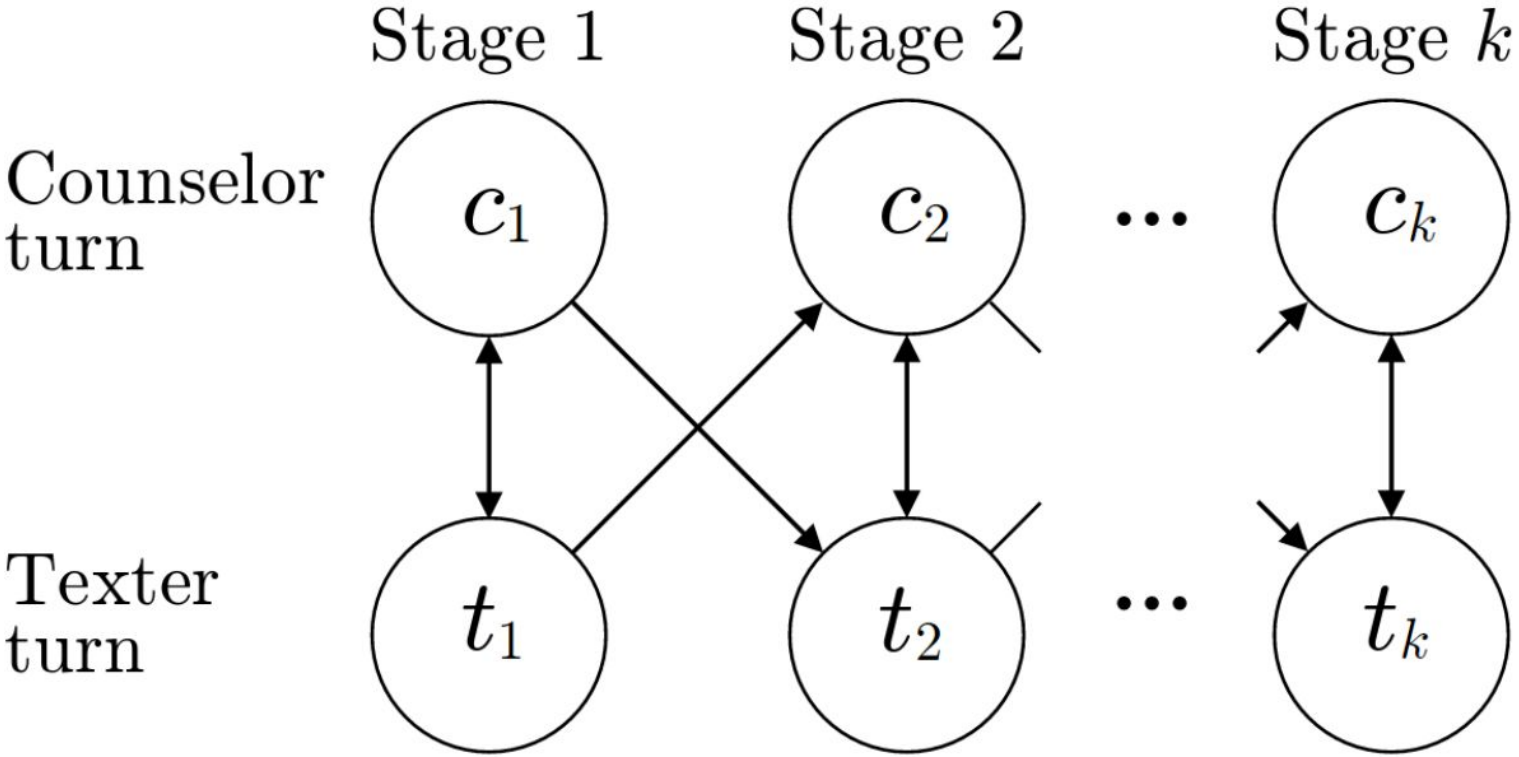
Counselor Creativity



Unsupervised Conversation Model



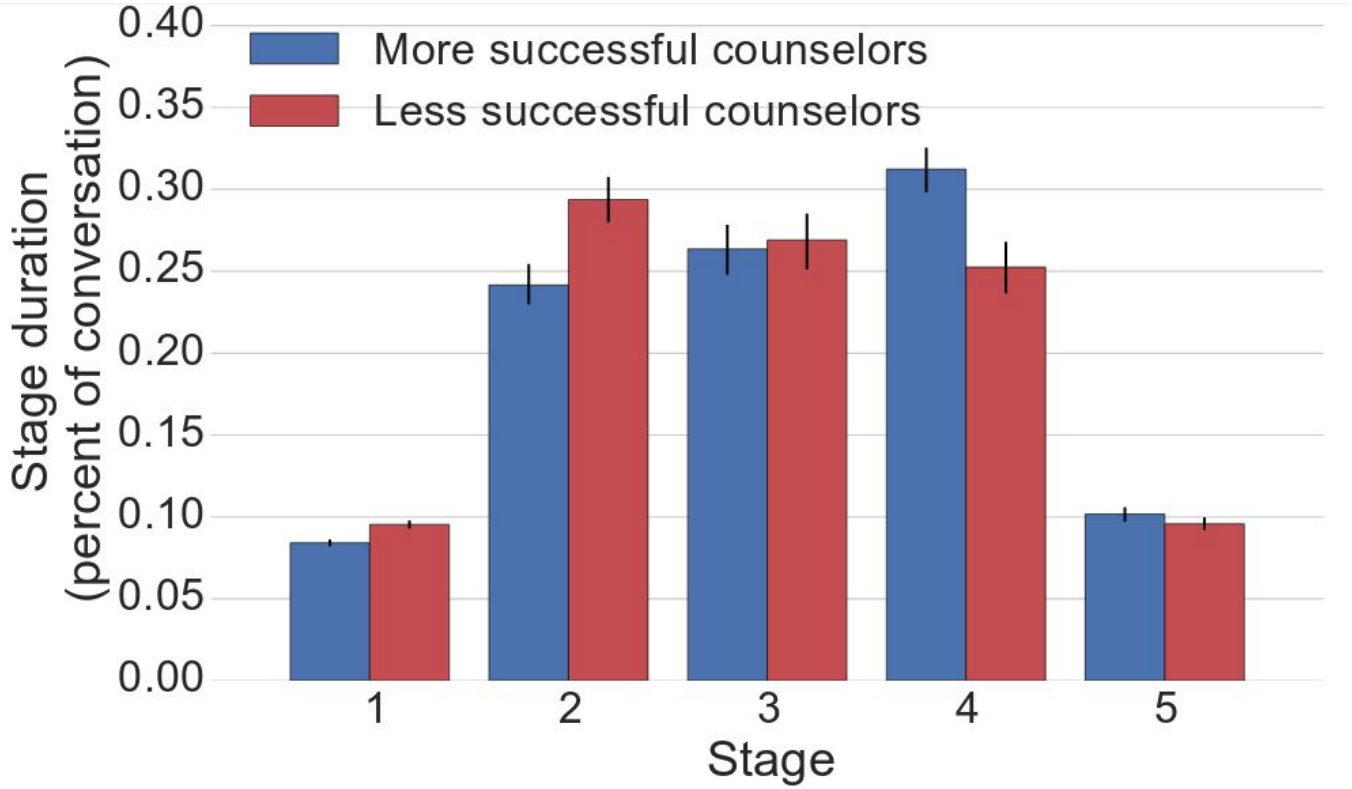
Unsupervised Conversation Model



Conversation Stages

Stage	Interpretation	Top words for texter	Top words for counselor
1	Introductions	hi, hello, name, listen, hey	hi, name, hello, hey, brings
2	Problem introduction	dating, moved, date, liked, ended	gosh, terrible, hurtful, painful, ago
3	Problem exploration	knows, worry, burden, teacher, group	react, cares, considered, supportive, wants
4	Problem solving	write, writing, music, reading, play	hobbies, writing, activities, distract, music
5	Wrap up	goodnight, bye, thank, thanks, appreciate	goodnight, 247, anytime, luck, 24

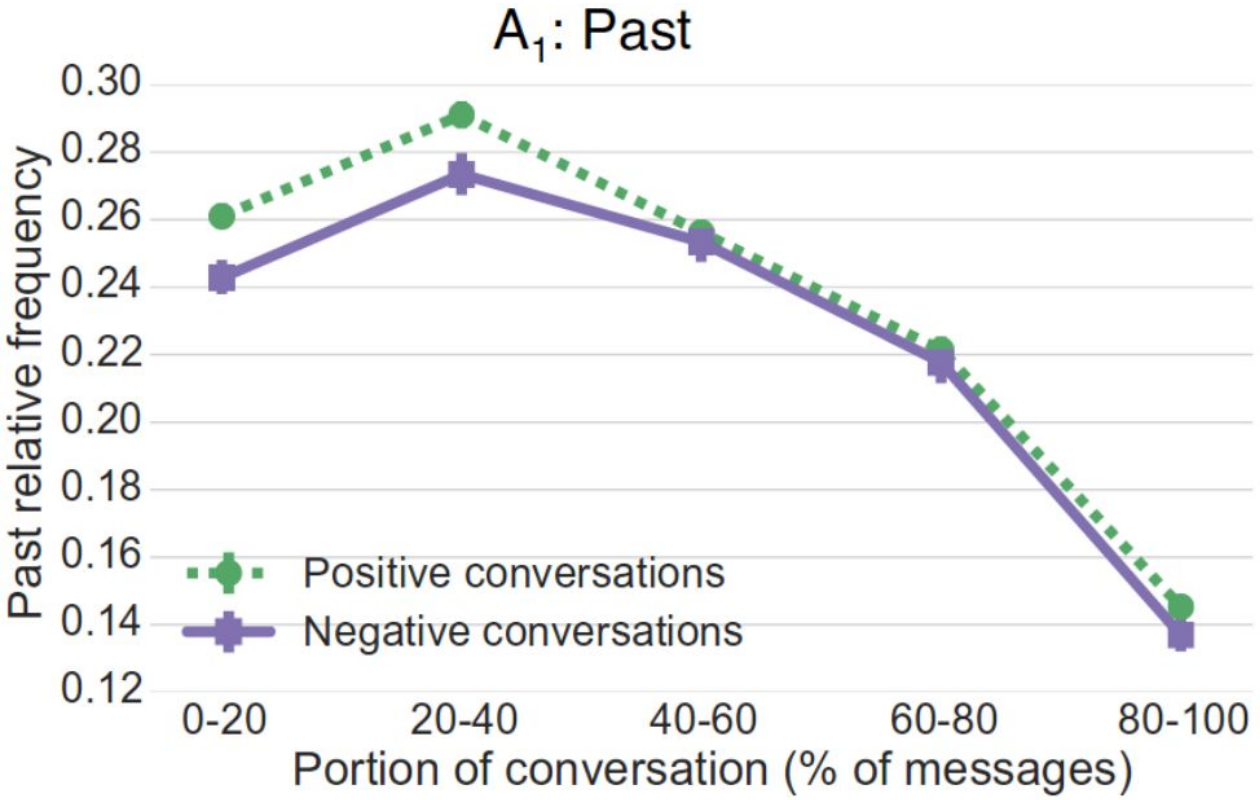
Counselor Progression



Linguistic Coordination and Power

- Texters coordinate less than counselors.
  - Texters hold more power in the conversation.
- More successful counselors coordinate less (have more power) than less successful counselors.

Perspective Change: Time



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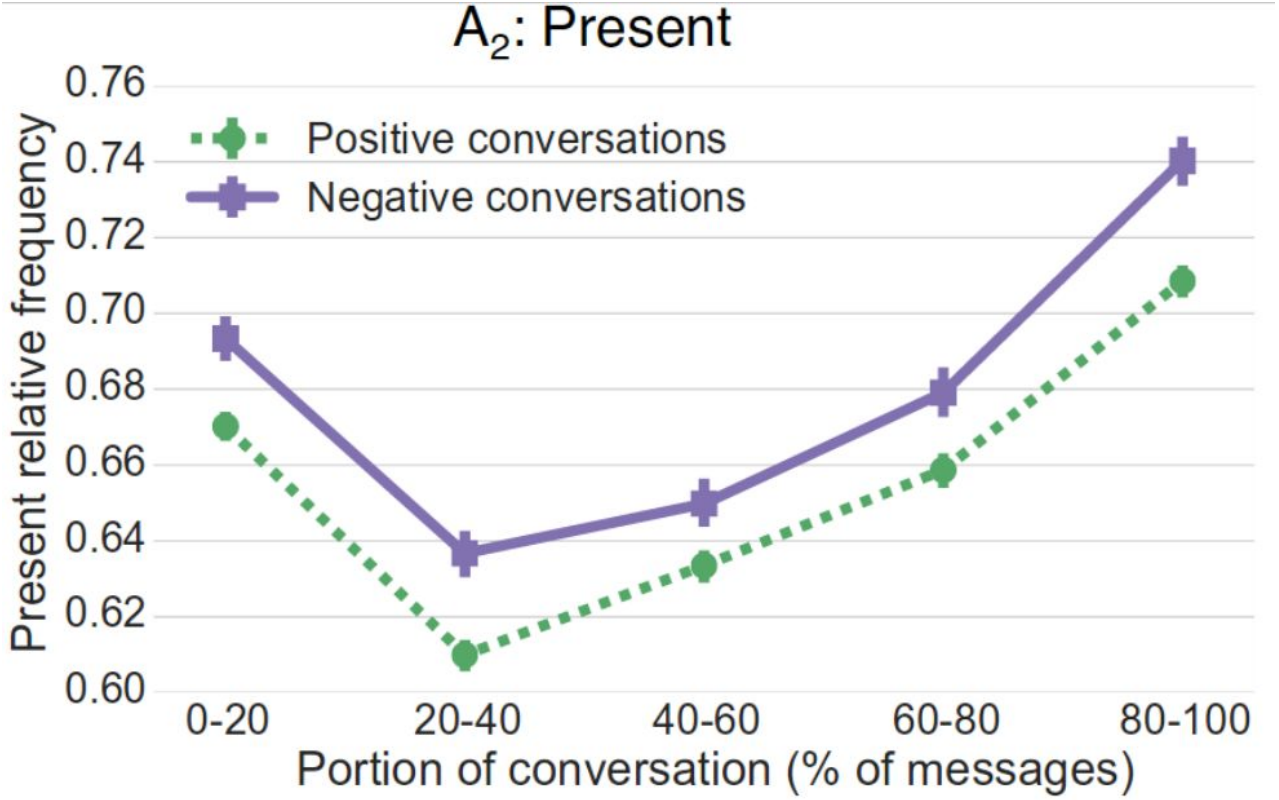

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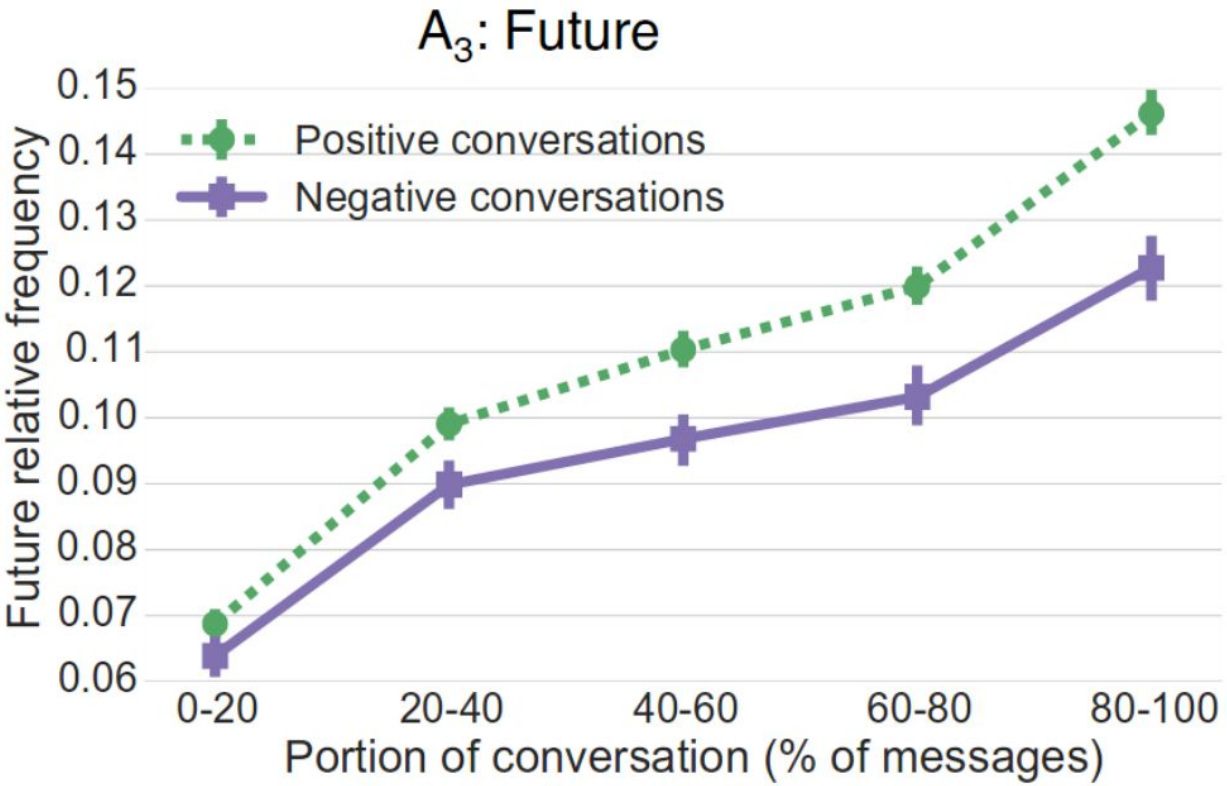
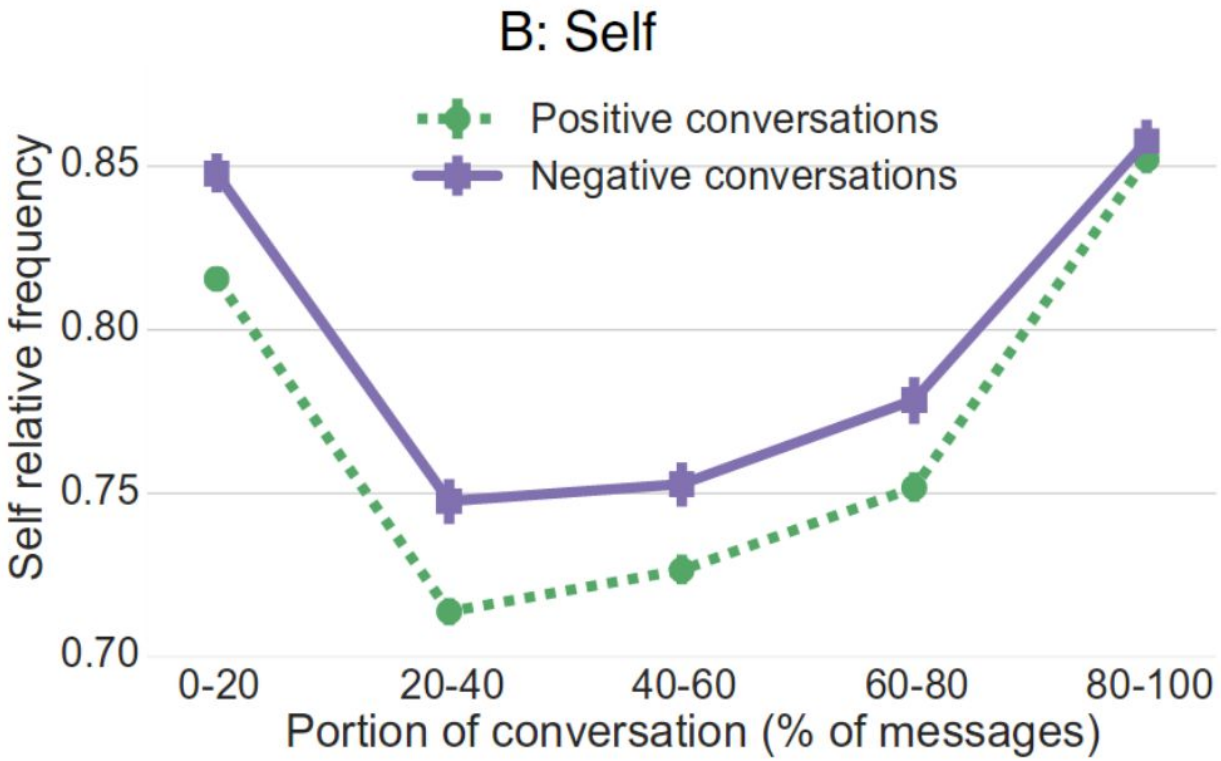
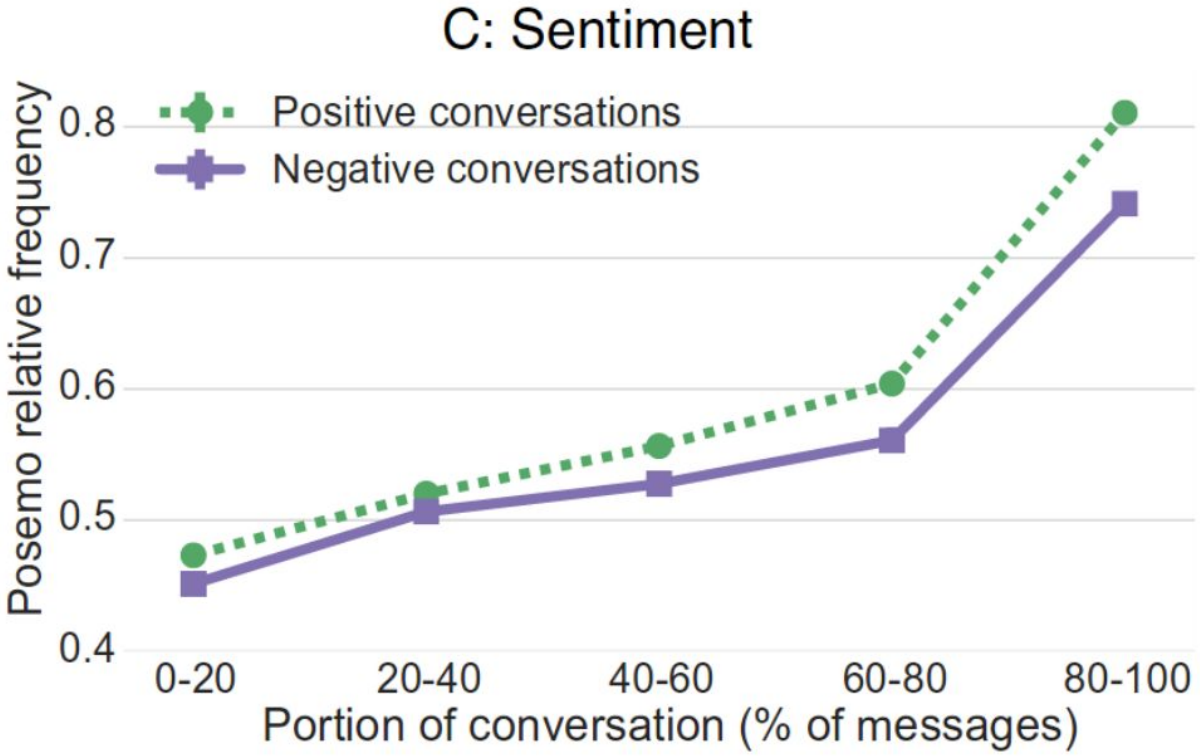


Perspective Change: Self



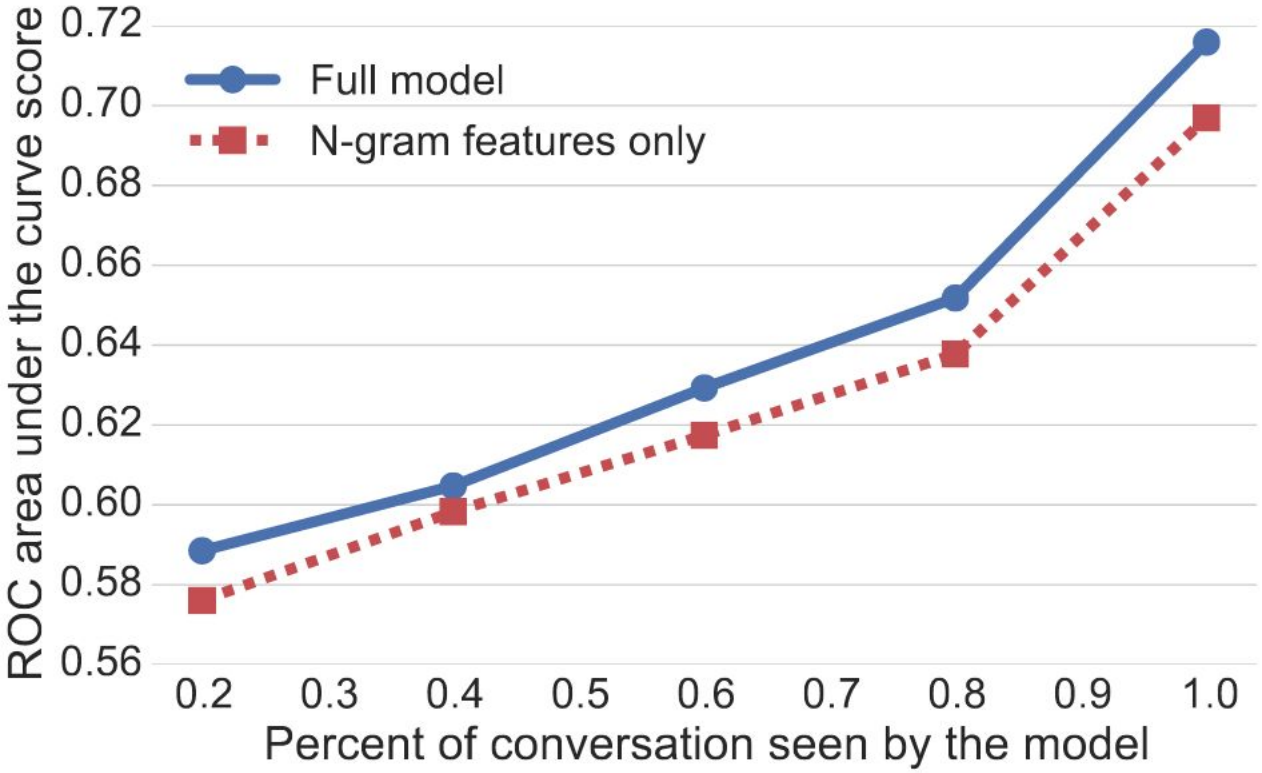
Perspective Change: Sentiment



Predicting Counseling Success

- Binary classification
  - Whether texter is feeling better or same/worse after the conversation
- Not 3-class, because authors are interested in improvement after conversation
- Logistic Regression
  - L1 regularization when features involve n-grams (to control sparsity?)
  - L2 regularization otherwise

Predicting Counseling Success



Feature Analysis

Features	ROC AUC
Counselor unigrams only	0.630
Counselor unigrams and bigrams only	0.638
None	0.5
+ hedges	0.514 (+0.014)
+ check questions	0.546 (+0.032)
+ similarity to last message	0.553 (+0.007)
+ duration of each stage	0.561 (+0.008)
+ sentiment	0.590 (+0.029)
+ message length	0.596 (+0.006)
+ stages feature conjunction	0.606 (+0.010)
+ counselor unigrams and bigrams	**0.652 (+0.046)**
+ texter unigrams and bigrams	**0.708 (+0.056)**

Recommendations

1. Adaptability
   - Be more sensitive to the current trajectory of the conversation.
   - React accordingly.
2. Dealing with Ambiguity
   - Clarify situations by writing more.
   - Reflect back to check understanding.
   - Make conversation partner feel more comfortable through affirmation.
3. Creativity
   - Respond in a creative way.
4. Making Progress
   - Be quick to get to know the core issue.
   - Be quick to move on to collaboratively solving the problem.
5. Change in Perspective
   - Actively induce perspective change in the conversation.

Thank you!