Conversations That Make You Feel Better

Applying Natural Language Processing to Mental Health

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STANFORD
INFOLAB

Social Support & Conversations

- Social support: We rely on others to care for us in times of need

- Emotional and informational support are typically offered through conversations

- Conversations are a critical building block to every day life and our relationships

How do you help someone feel better?

- Focus on mental illness & counseling

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- 43.8 million adults (18.5%) in the U.S. experience mental illness each year
- Counseling conversations can help in crises and with mental illness
- Existing research typically small scale & qualitative
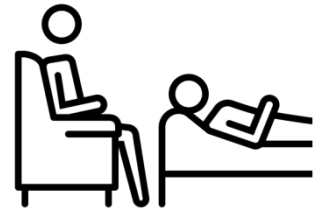
Our Study

1. Develop novel computational discourse analysis methods applied to counseling conversations

2. Quantify conversation dynamics in the largest quantitative study of counseling to date

3. Discover successful conversation strategies
   - Findings have already impacted counselor training

The Data

- Collaboration with nonprofit supporting people in crisis through text messaging
- Texters talk to extensively trained volunteer counselors

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- Collaboration with nonprofit supporting people in crisis through text messaging
- Texters talk to extensively trained volunteer counselors
- Conversation outcomes: measure of "success"
  - Follow-up survey
  - Positive / negative conversations
- Scale: 80,855 conversations, 3.2 million messages

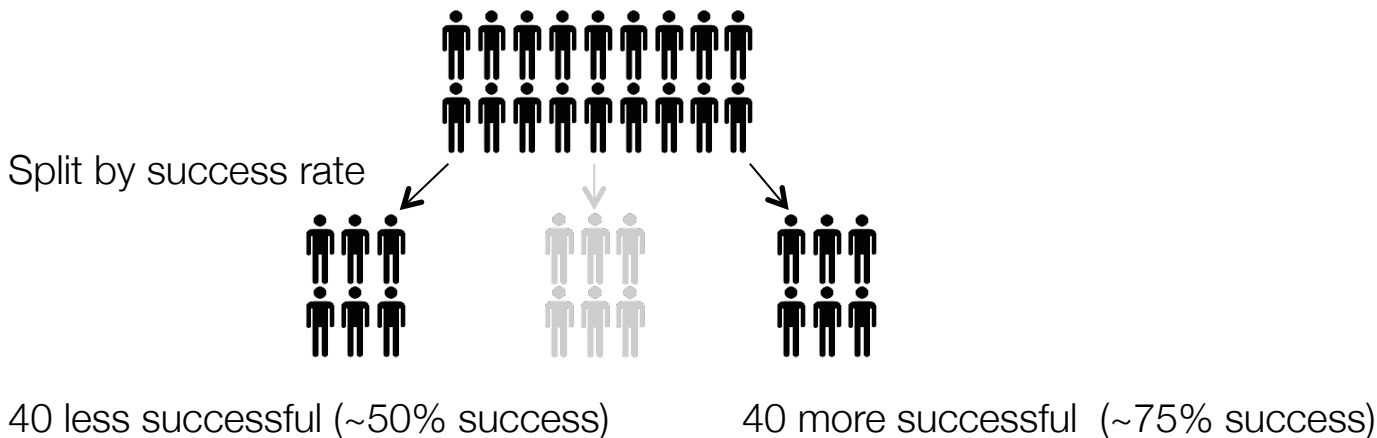# From Conversation to Counselor Quality

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- Counselor success rate: Fraction of conversations rated positively by texter

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40 less successful (~50% success)   40 more successful (~75% success)

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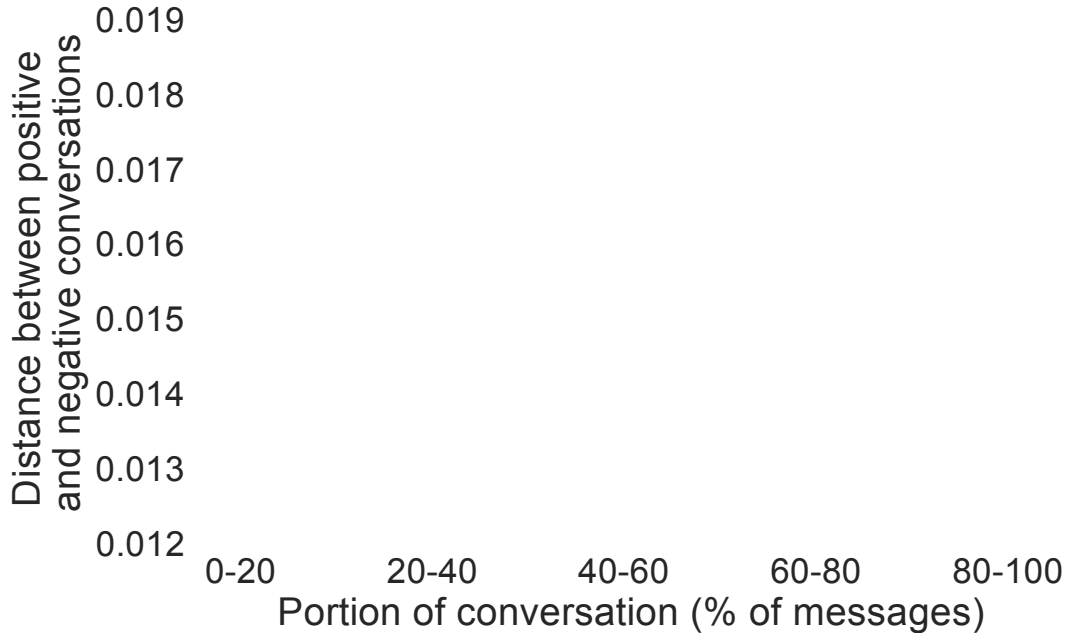40 more successful (~75% success)
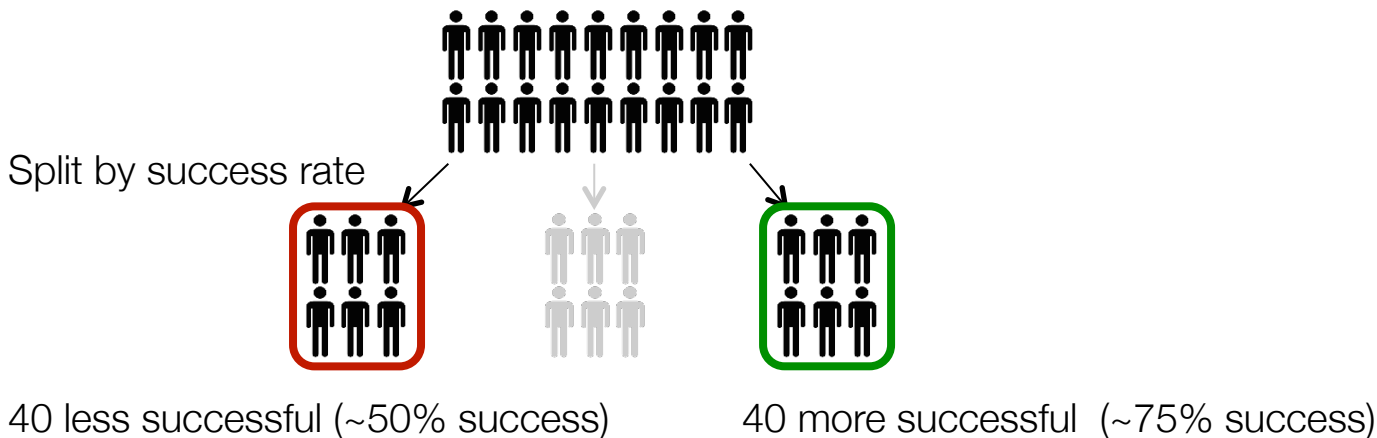
1. Adaptability: Concept

- Are counselors aware of how conversations are going?
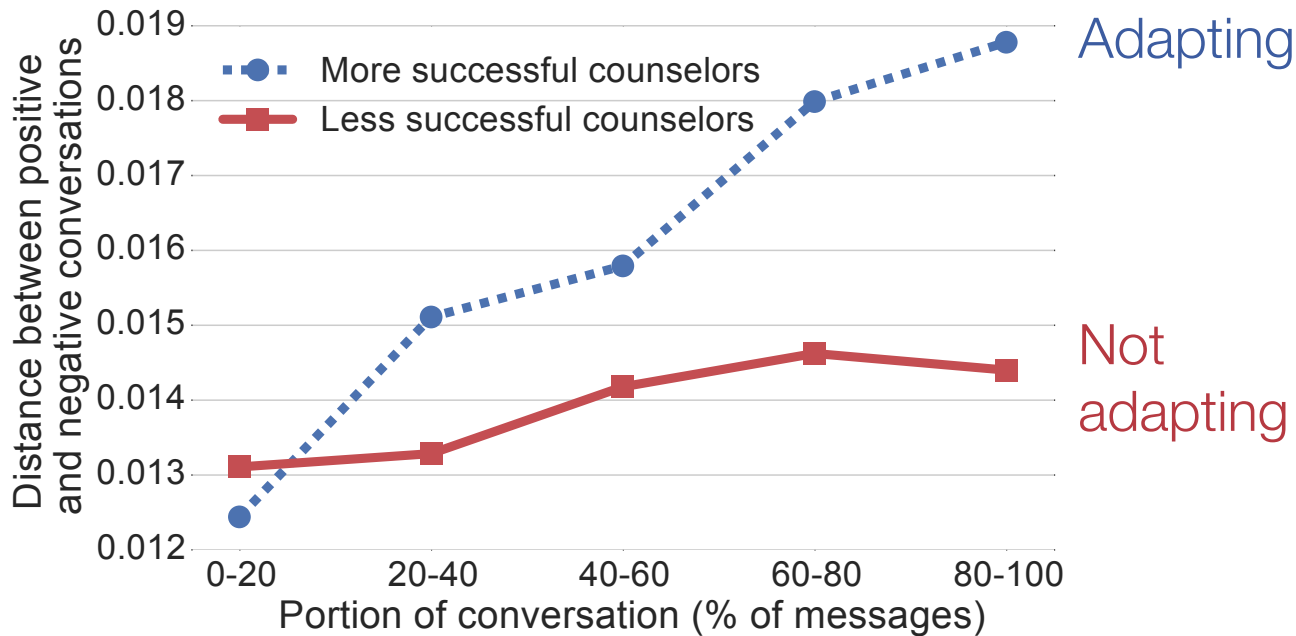 Do they adapt to the conversation?

1. Adaptability: Concept

- Are counselors aware of how conversations are going?
  Do they adapt to the conversation?

- Compute distance between counselor language in positive/negative conversations
  - Represent language with TF-IDF vector of word occurrences
  - Cosine similarity for distance

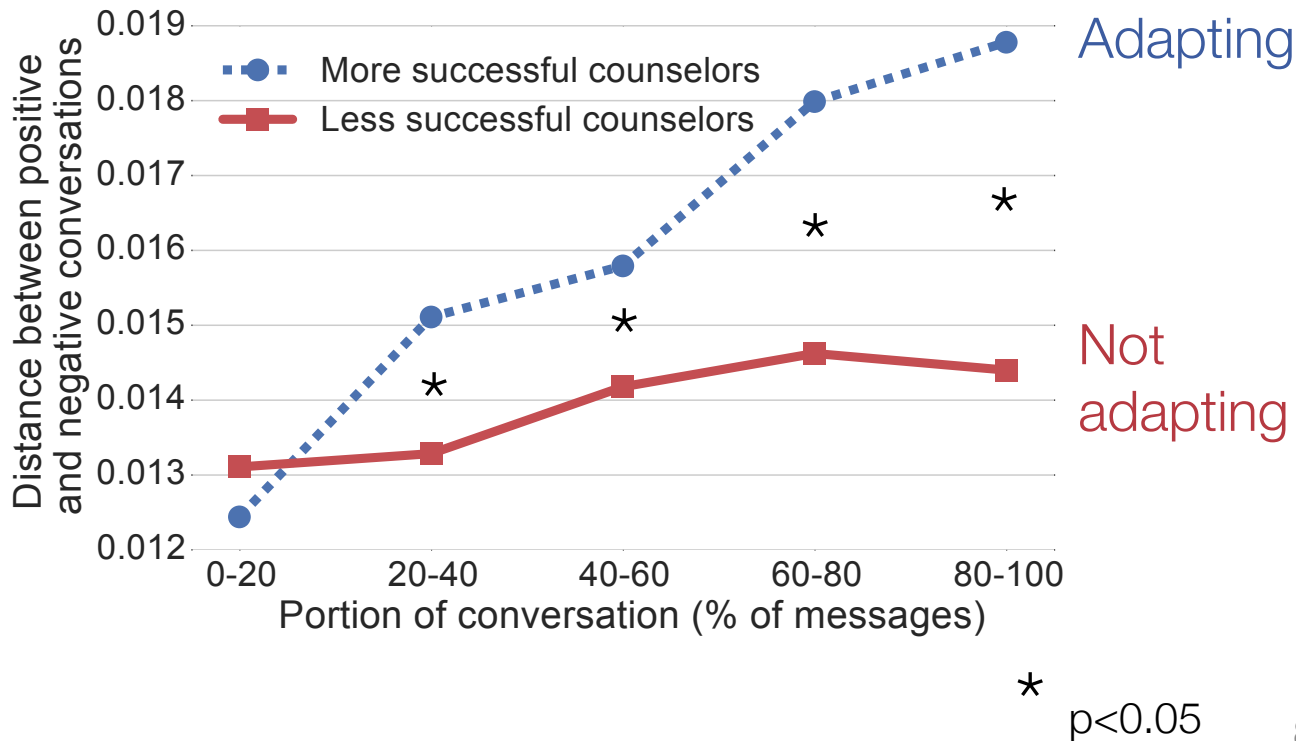- Observe how distance changes over time

1. Adaptability: Result

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Chart showing "Distance between positive and negative conversations" (y-axis, 0.012 to 0.019) versus "Portion of conversation (% of messages)" (x-axis: 0-20, 20-40, 40-60, 60-80, 80-100).

Legend:
- More successful counselors (blue dotted line) — Adapting
- Less successful counselors (red solid line) — Not adapting

* $p<0.05$

2. Conversation Progress

- Is there a higher-level structure to counseling conversations?
- How do counselors navigate this structure?

- Use techniques from unsupervised conversation modeling to learn ordered sequence of *conversation stages*

2. Conversation Progress: Model

- Assign each message in each conversation a stage using a Hidden Markov Model with constraints on state transitions

Conversation as sequence of text messages

m_1

m_2

m_3

m_4

m_5

Model assigns a stage to each message

m_1 stage 1

m_2 stage 2

m_3 stage 2

m_4 stage 3

m_5 stage 4

2. Conversation Progress: Stages

Stage	Interpretation	Texter top words	Counselor top words
1	Introduction	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

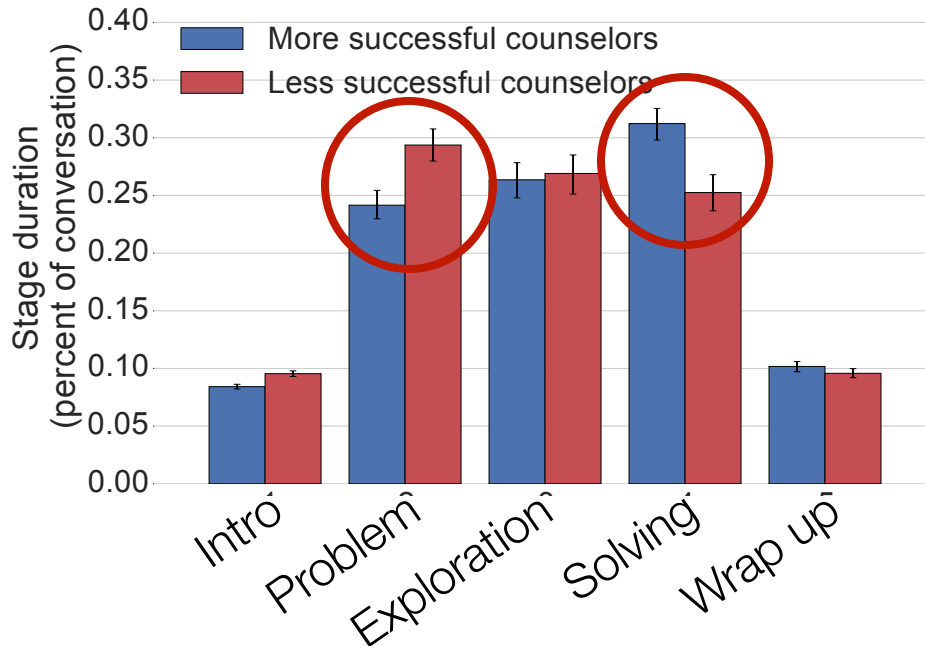# 2. Conversation Progress: Results
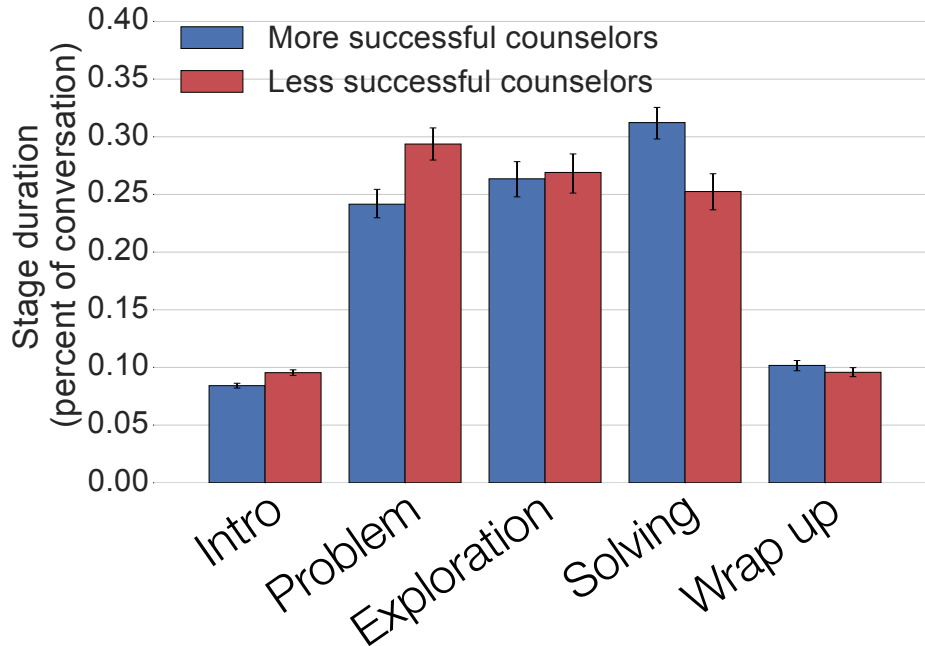
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Finding: More successful counselors are quicker to know the problem and spend more time in the problem solving stage (p<0.05)
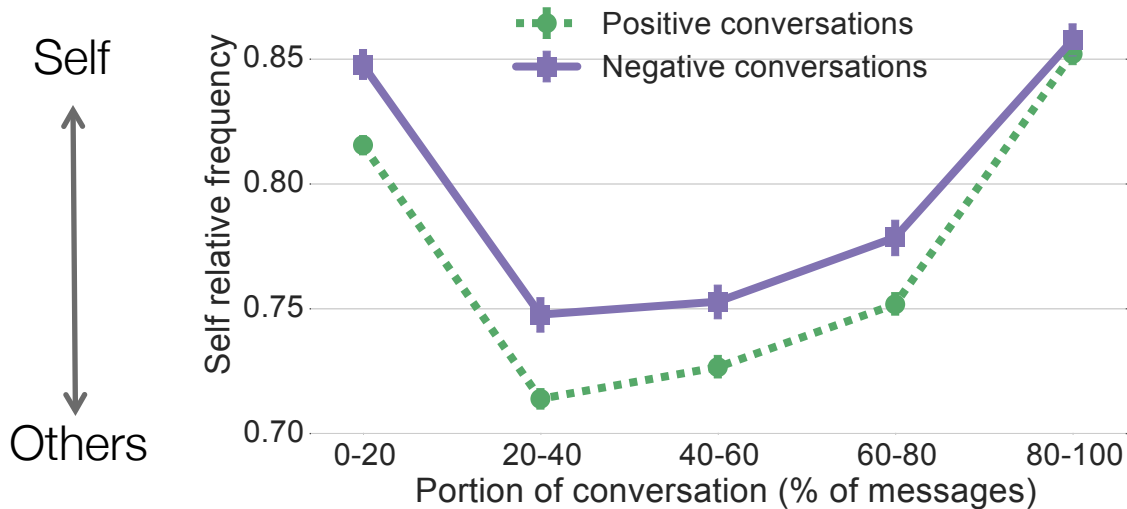
3. Perspective Change

- Prior theory relates depression to a self-focusing style instead of focusing on others (Pyszczynski and Greenberg,1987)
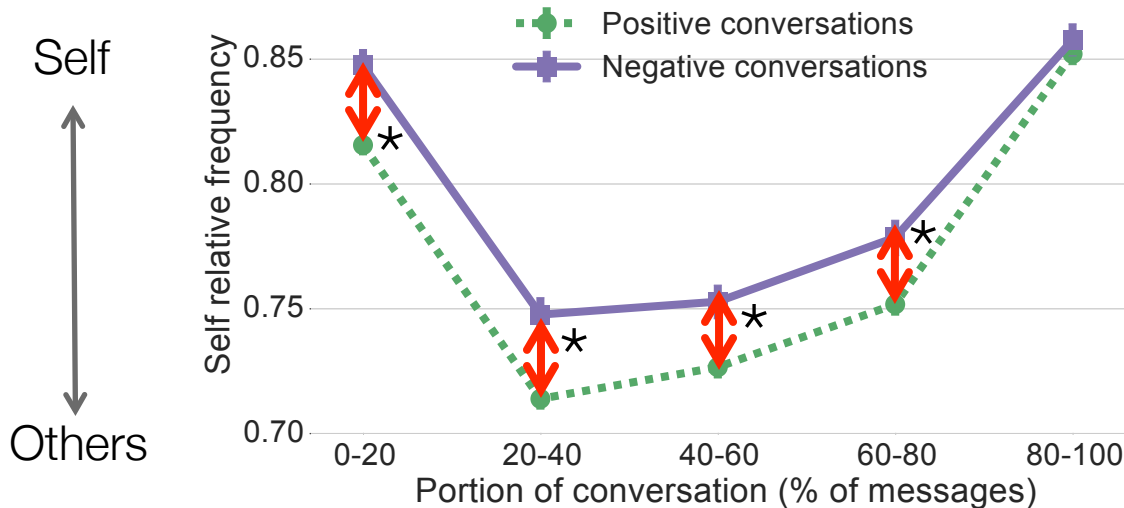
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- We quantify perspective change by tracking the frequency of LIWC markers (Tausczik and Pennebaker, 2010)

    - "I, me, myself, …" vs "he, she, they, …"

3. Perspective Change: Self-Focus

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- **Finding:** Texters who talk less about themselves and more about others tend to have successful conversations
- **Linguistic coordination:** Counselors can actively facilitate perspective change through their language

Conversation Strategies

1. Adapt to the conversation
2. Work towards making progress
3. Facilitate perspective change

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- Implications for counselor training and conversation support tools
  - Is conversation going well?
  - How would a successful response look like?

How to help someone feel better?

- Better social support through good conversations
- Computationally operationalized anecdotal knowledge through novel discourse analysis methods
- Dataset available!
  http://snap.stanford.edu/counseling

Ask me anything!

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