

# Cue Phrases in Spoken Language: Discourse Pragmatics at the Forefront

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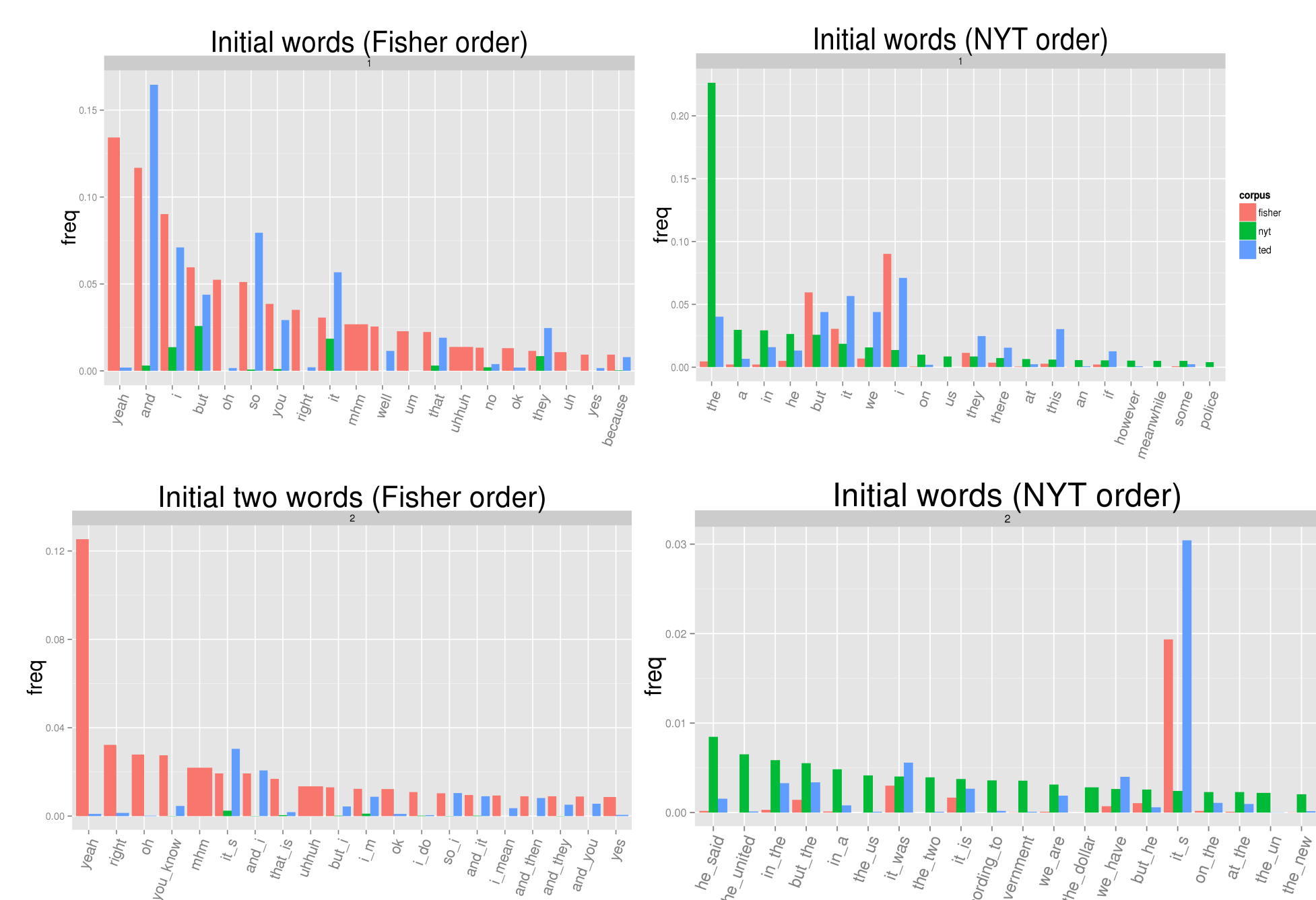
## Introduction

- **Aim:** Model discourse for speech applications
- **Application:** Generate and interpret prosody
  - **Topic structure** (intersentential)
  - **Information structure** (intrasentential)
- **Question:** How can we use cue phrases, topic and information structure to understand discourse structure on large datasets?

## Cue phrases: Speech vs Text

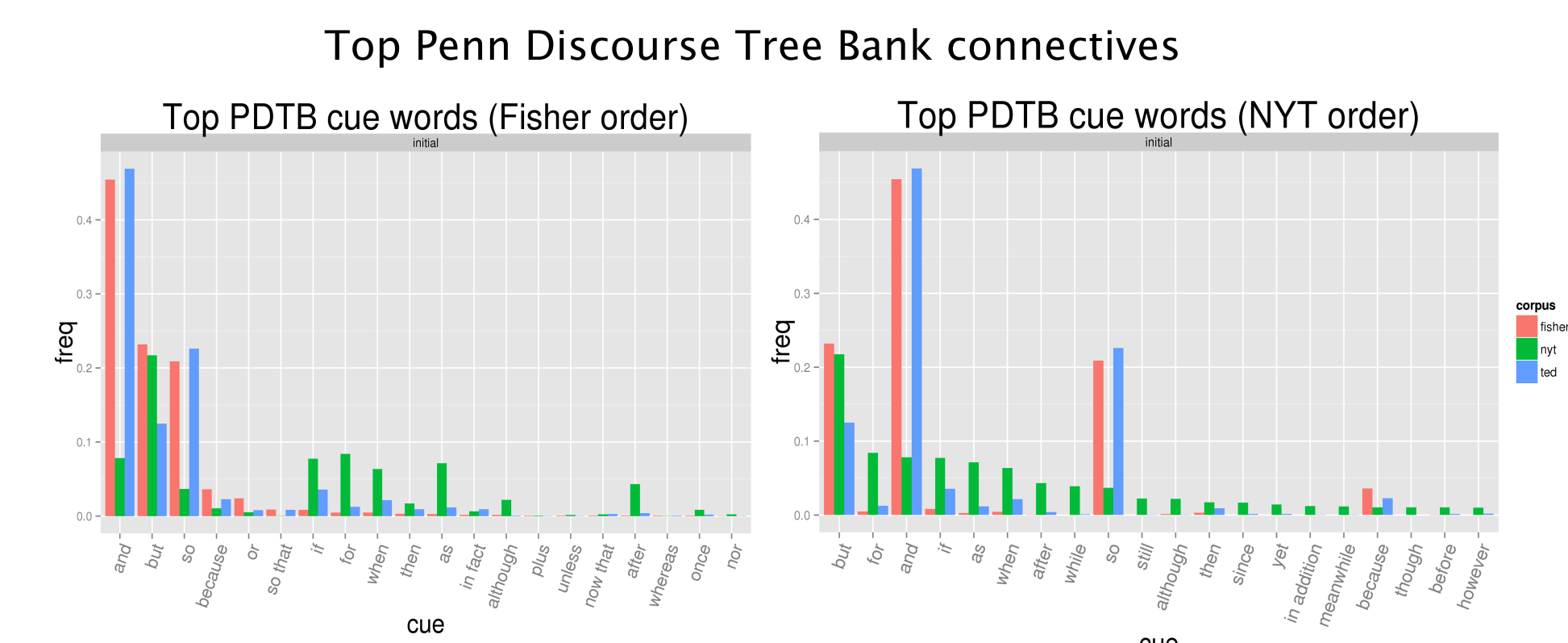
- Discourse markers are very frequent in speech
  - e.g. *yeah, so, well, I mean, you know,...*

Top sentence initial words in Fisher telephone conversations, TED lectures, New York Times text (Gigaword).



→ Pragmatically oriented discourse markers dominate spoken language

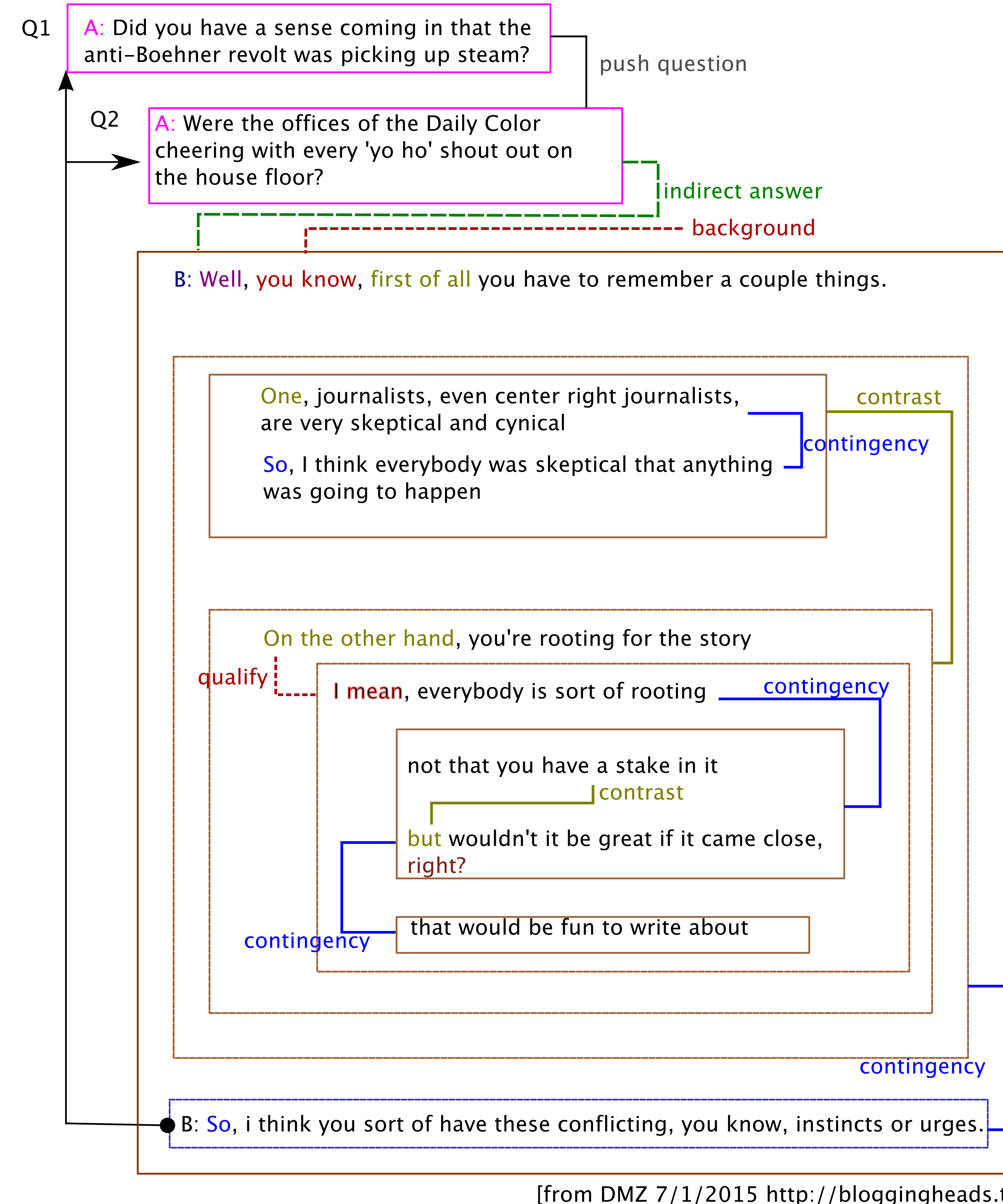
- Compare with PDTB explicit connectives:



- Rhetorical/semantic structure runs concurrently with pragmatic structure.

→ Model via Questions Under Discussion

## Discourse structure, questions, and topics



[from DMZ 7/1/2015 <http://bloggingheads.tv>]

Cue phrases help indicate how discourse constituents are related

### Questions Under Discussion

- Q1: Did **you** have a sense the **anti-Boehner revolt** was picking up steam?  
 Q2: Were **the offices of the Daily Color** cheering with every yo ho...?  
 Indirect Q: **What** needs to foregrounded before an answer?  
 IQ: **What** are the **relevant properties** of the **Daily Color journalists**?  
 IQ: **What** **journalists** like?  
 A: **Journalists** are **skeptical and cynical**  
 IQ: **Why** is this relevant?  
 A: **Everyone was skeptical that anything was going to happen**  
 IQ: **How** do these **journalists feel** about **the story**?  
 A: **Everybody is rooting for the story**  
 IQ: **Why** are **they rooting** for the story?  
 A: **No**  
 IQ: **Why** else **root** for the story?  
 A: **It would be great if the vote came close**  
 IQ: **Why** would **it be great if the vote came close**?  
 A: **It would be fun to write about**  
 IQ: **How** does this relate to Q1?  
 A: **Conflicting instincts or urges prevent a direct answer**

Answer to Q1 = It's complicated!

## Rhetorical relations?

Via the QUD stack, we see:

- **Introduction of new topics:**
  - Co-ordinating, paratactic relations
  - e.g. Narrative, closing off a subquestion branch
- **Questions about an existing topic**
  - Sub-ordinating, hypotactic relations
  - e.g. Elaboration, *what about this aspect of X?*
- **Inference/summary questions**
  - e.g. Contingency: *why?, how does it relate?*
  - e.g. 'So' pops the question stack?

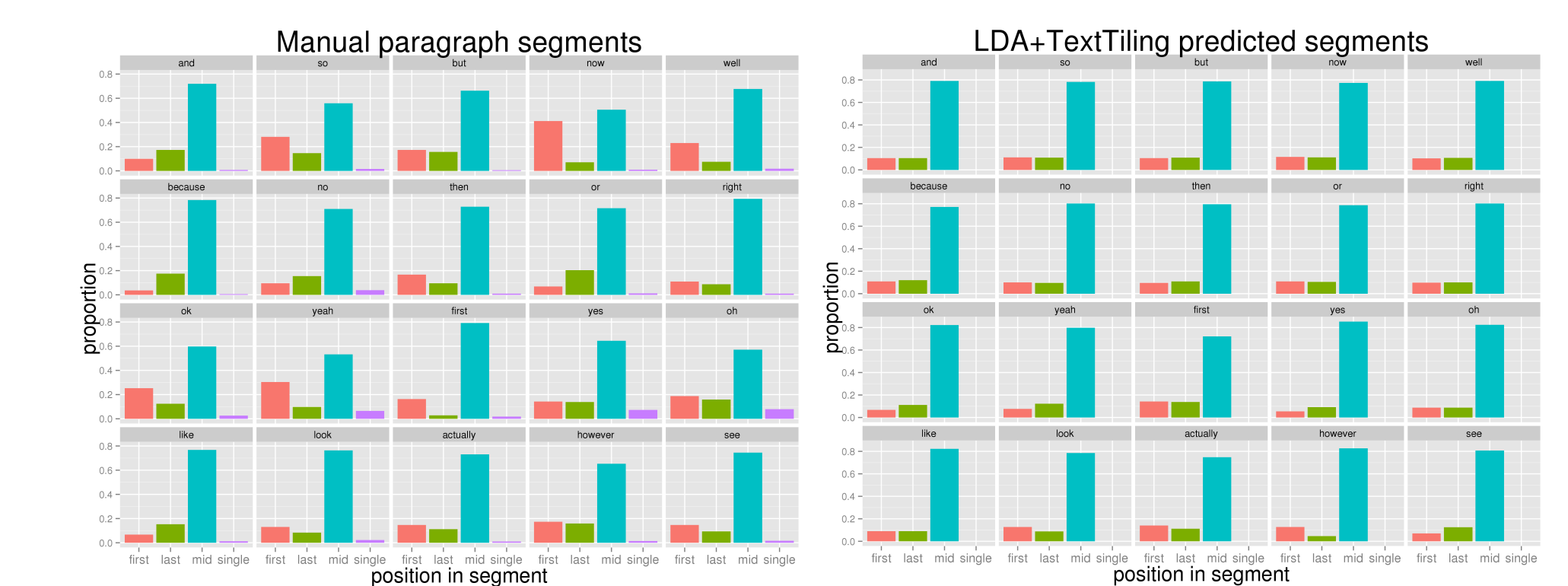
## QUD and topics

- QUD indicates Information Structure:
    - What to update: **discourse topic/theme**
    - How to update: **new info/rheme, link**
  - QUD + IS + cue phrases provides useful detail on rhetorical relations and hierarchical discourse structure.
  - **However**, large scale manual QUD annotation is not really feasible.
- Q: **What tools can we use to advance this?**  
 → *Discourse topic* ↔ *topic modelling?*

## Cues phrases and topic shifts

Q: Do cue words pattern consistently around topic shifts?

Position in paragraph: Manual breaks vs LDA+TextTiling 1365 TED talks, top 20 cue words from Hirschberg & Litman (1994)

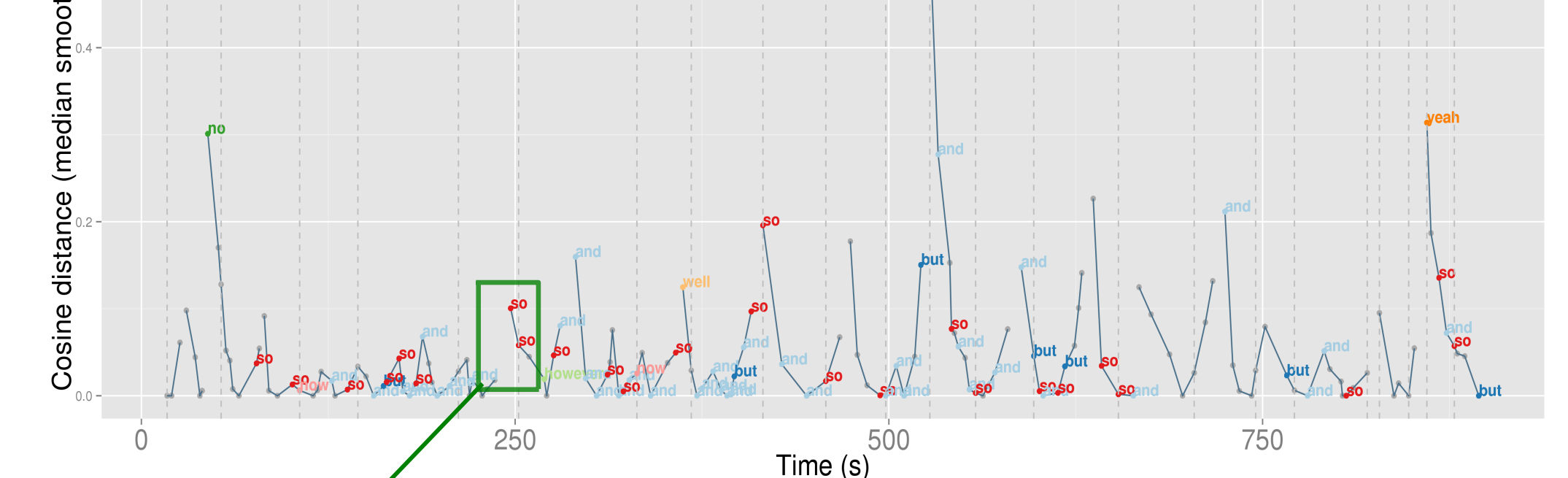


A: Well, it's clearer for manual paragraph breaks!

*so, now* → first → structural indicators  
*because, or* → last → semantic connectives

However, incorrect predicted topic shifts often seem plausible...

LDA TextTiling dissimilarity (window = 5 sentences) Amy Smith, TED 2006



What we wanted to do was we wanted to find a way to harness this waste resource and turn it into a fuel that would be something that people could easily cook with, something like charcoal.  
 pause=1.19 predicted  
 So over the next couple of years, students and I worked to develop a process.  
 pause=0.49 manual  
 So you start with the bagasse, and then you take a very simple kiln that you can make out of a waste 55 gallon drum.

Need to investigate:

- Reliability of segmentations,
- Relationship with audiovisual cues, e.g. prosody.

→ *Finer grained topic segmentation and integration with update semantics is needed.*

## Ongoing work

- Predict prosodic changes from topic features and cue phrases and vice-versa
- Investigate span of cue phrase arguments
- Integrate outputs of semantic parses, e.g. AMR
- Manual validation...