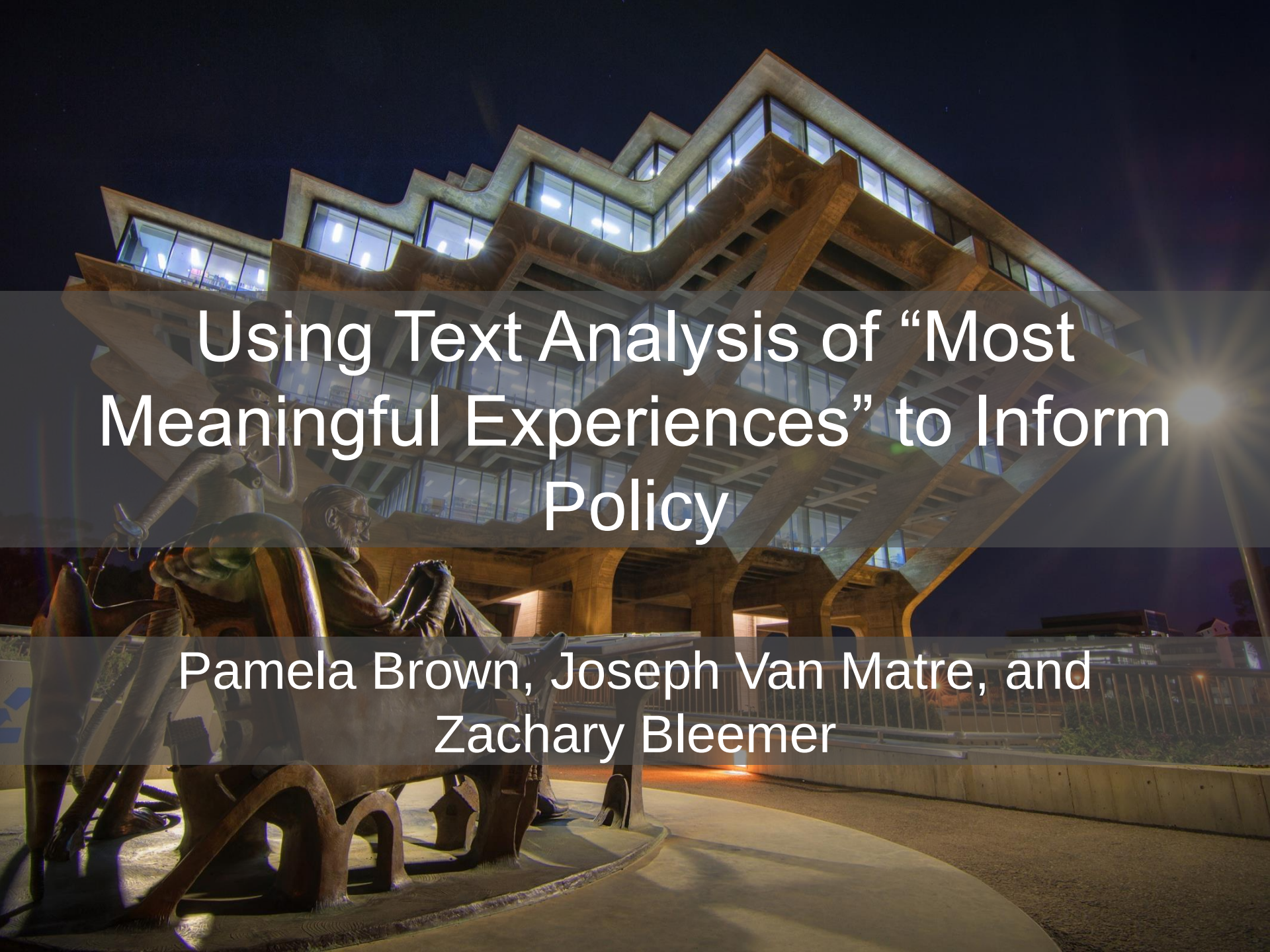


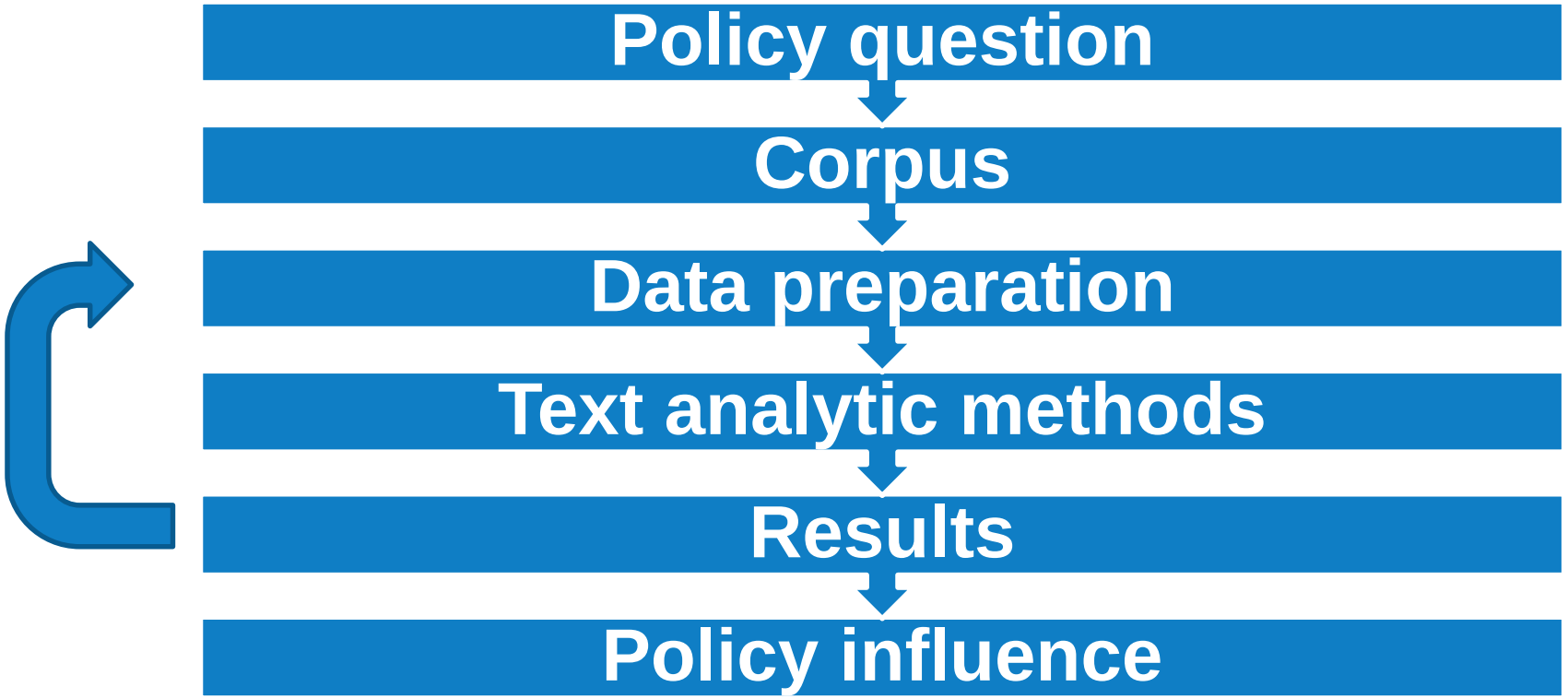
# Using Text Analysis of “Most Meaningful Experiences” to Inform Policy

Pamela Brown, Joseph Van Matre, and Zachary Bleemer

# Agenda

- Introduction
- Framework
- Policy Question
- Text Analysis Strategies
  - Word use frequency
  - Sentiment analysis
  - Topic models
- Policy influence

# Analytical framework




***NOTE: Sample R code will be made available for all methods described in this presentation***

# Policy Question: Strategic Planning for UC 2030

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## University of California aims to improve graduation rates by 2030

*Focus is on low-income, African-American, Latino and first generation students.*

SEPTEMBER 20, 2019

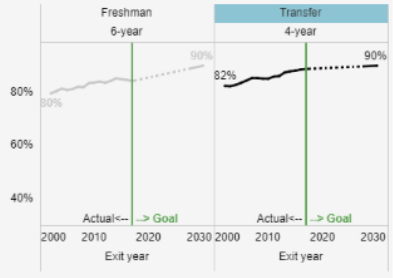
## UC 2030 Dashboard

UC has goals to (1) produce 200,000 more undergraduate and graduate degrees on top of the 1 million already projected; (2)achieve a 90 percent overall graduation rate and eliminate gaps for Pell, first-generation and underrepresented groups; and (3) invest in faculty and research by adding 1,100 ladder rank faculty over the next four years. This dashboard presents systemwide and campus goals and a means to track progress. State funding is a critical component to success and UC has requested $60 million in permanent funding over the next four years. UC will present any funding received for the system with allocations by campus.

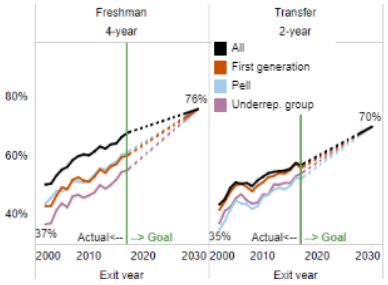
Select Campus: Universitywide

**Award 1.2 million degrees between 2015-16 and 2029-30**

**Increase freshman and transfer graduation rates**




**Close graduation rate gaps by 2030**



# Define your corpus

What is one of the most meaningful learning experiences you have had at “your UC campus”?

Taking sociology with [professor]. Hearing where he came from and the experiences he went through to be able to make it to this level of academia was very inspiring.

Joining the rowing team. Learning how to study and be successful in my classes.

Projects!

College is expensive.

Learning you won’t be reached out to, you have to be the one that reaches out.

# Data Preparation:

- Merge survey responses to student characteristics
- Generate list of all popular words in responses
  - Omit words that appear fewer than 50 times
  - Omit “stop words” like prepositions
  - “De-stem” words (e.g. remove plural ‘s’ and verb conjugations)
  - Remove “invalid” words that will impair results (e.g. campus names)
- Add common two- or three-word phrases

# Three text analysis tools:

1. **Word use frequency by group**
2. Sentiment Analysis
3. Topic Models

# Methodology:

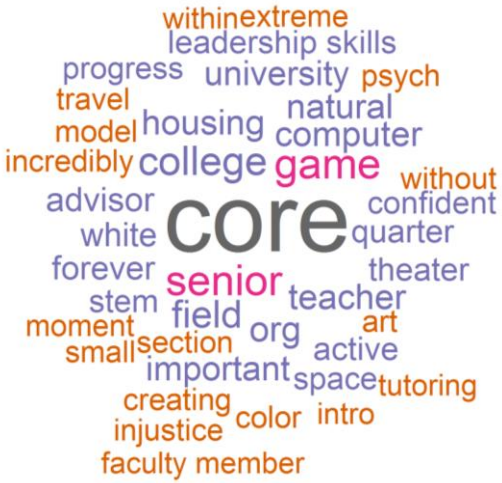
- Produce a data frame with:
  - Student characteristics, usually defined as binary variables
  - 0/1 indicators for every identified word
- Estimate linear regressions of each student characteristic on all of the word indicators
- Produce word clouds of the words with the highest estimated t-statistics (from the null hypothesis)
  - t-statistics are higher if (1) the word is more common (bypassing outliers) and (2) the word disproportionately appears in the responses of students with the given characteristic

# Word frequency examples: simple word cloud

# Word frequency examples: UC campuses

UC Davis

UC Santa Cruz




UC Merced

# Word frequency examples: Ethnicity

Asian

Hispanic

White

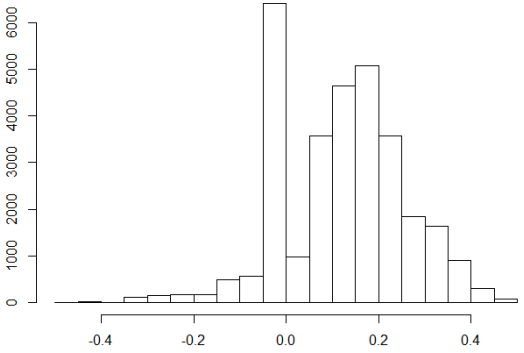
# Three text analysis tools:

1. Word use frequency by group
2. **Sentiment Analysis**
3. Topic Models

# Methodology:

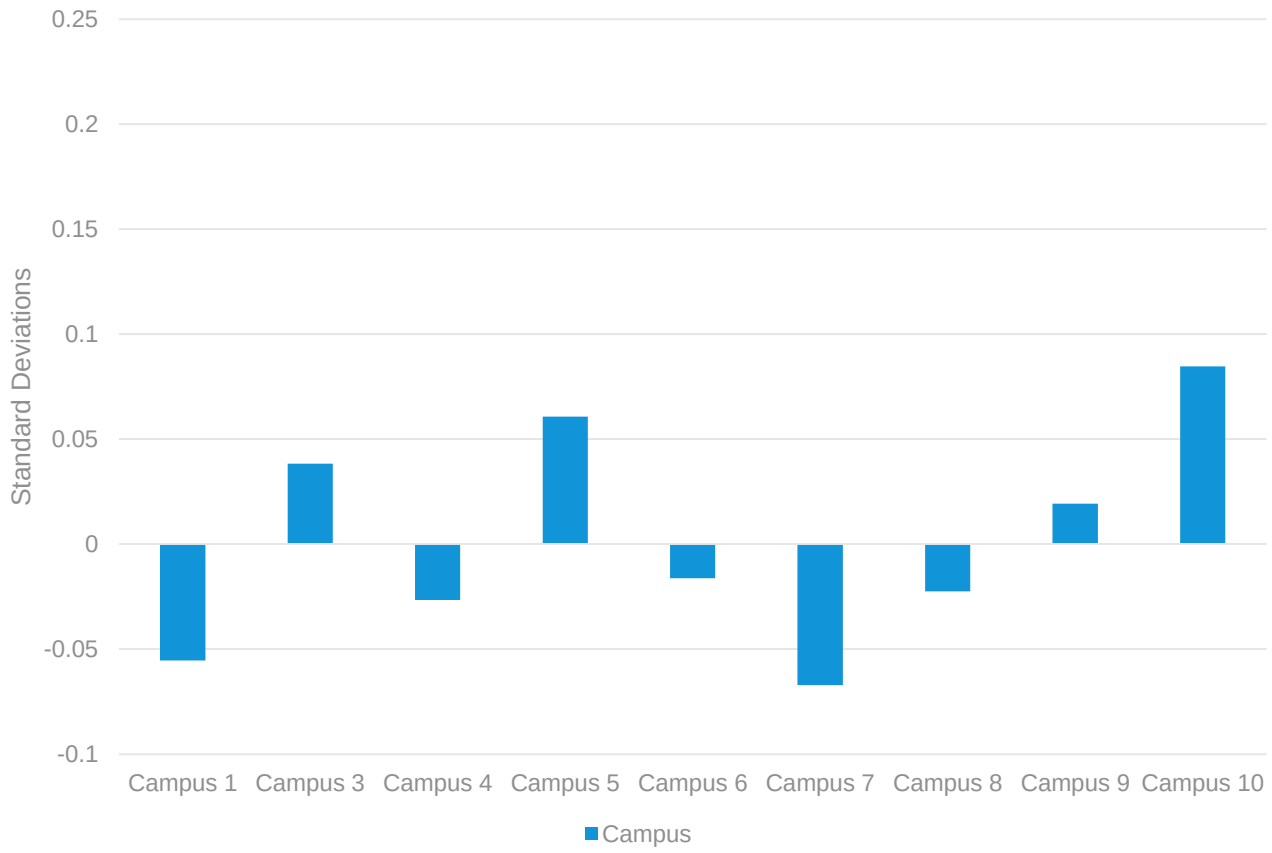
- Estimate ‘Positive’ and ‘Negative’ sentiment of each response
  - Uses the “SentimentAnalysis” R package
- Estimate linear regressions of response sentiment against student characteristics
- Produce word clouds of the words most-associated to positive and negative responses

Histogram of response sentiment measures

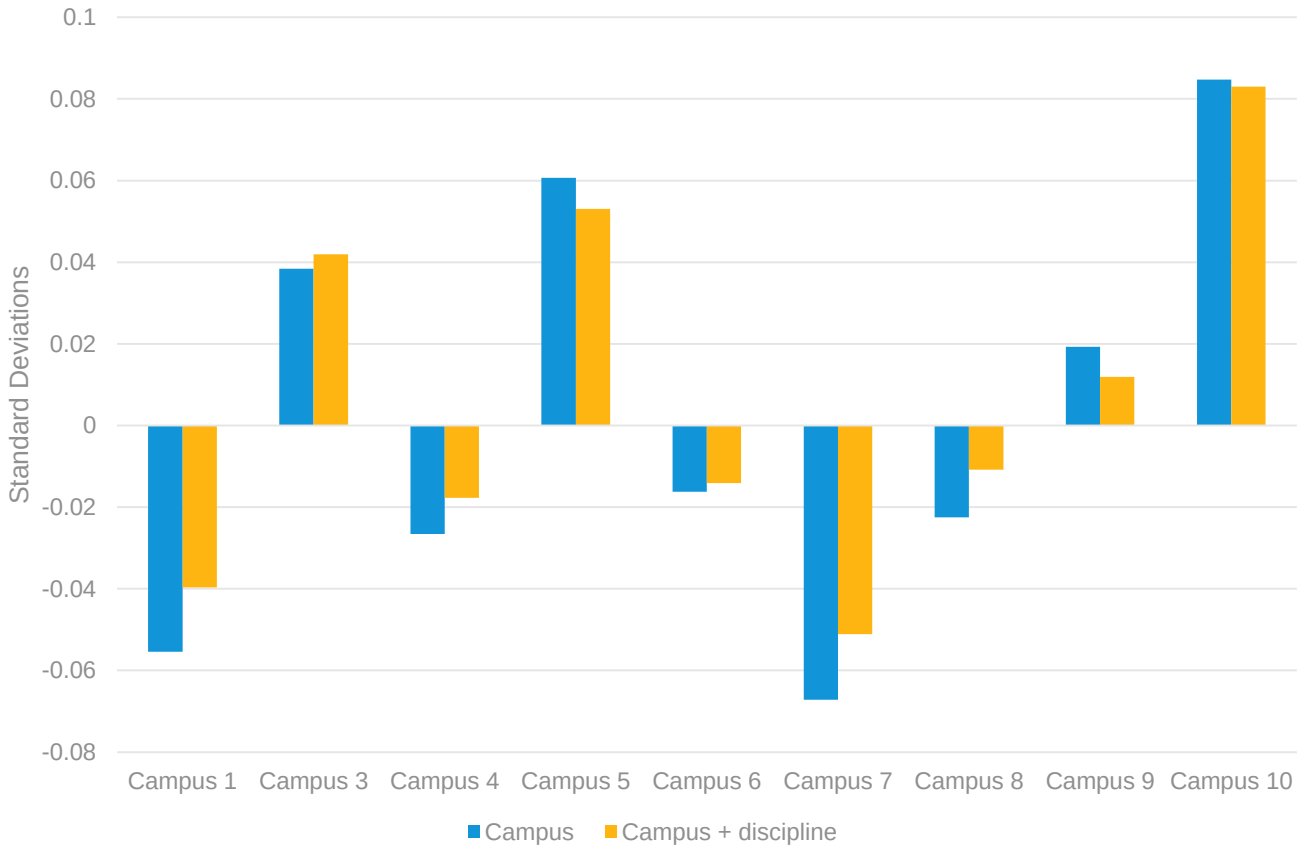



*Note: sentiment ranges from -1 to 1*

# Regression estimates: effect size of estimates



# Regression estimates: effect size of estimates



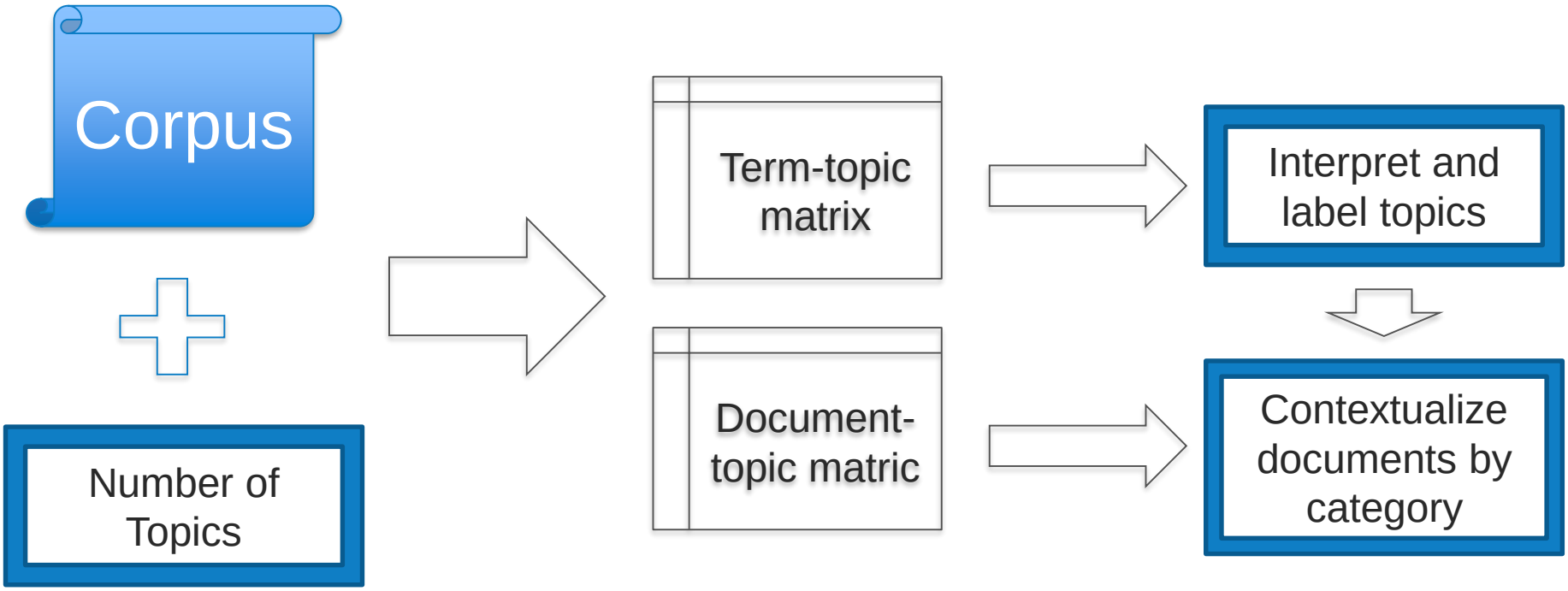
# Three text analysis tools:

1. Word use frequency by group
2. Sentiment Analysis
3. **Topic Models**

# Methodology:

- Computationally identify “topics” in responses
  - Uses the “topicmodels” R package
  - You choose the number of topics (we chose 30). The computer finds them, characterized by often-adjacent words
- Each topic is characterized by the words that appear more-frequently in that topic; each response is characterized by its topics
- Regress student characteristics on topic composition to identify which topic is most-associated

# Methodology:



**UC Berkeley** is most closely associated with topic 17, which looks like this:

**UC Merced** is most closely associated with topic 10, which looks like this:

# Example: **Pell Students** are most closely associated with topic 25, which looks like this:

Topic 25:

# Using results to influence policy

**Using the data to inform 2030 strategic goal setting:**

- Identify experiences that matter
- Identify programs and strategies that have impact
- Find artifacts that tell a *representative* story

# Using results to influence policy

**Survey responses that highlight program impact**

"For me the most meaningful learning experience was being disqualified from the university because of low grades that were caused by difficulty with anxiety that I developed at college.

However the support of my CAPS counselors, Marshall academic advisors and some faculty helped me return and succeed. These faculty that helped me…really helped me overcome my condition and regain confidence in myself."

**Survey responses that support sense of belonging**

"Being able to make new friends knowing you're not the only one that may experience certain struggles. It made my first year college experience somewhat more easy to handle."

"The most meaningful learning experience that I have had so far was discovering the importance of self care... I have had to deal with the most stress and anxiety I have ever had...but there are campus resources to help me deal with it."

Fixed-effect word regression, sentiment analysis, and topic modeling can be implemented "out-of-the-box."

Computational text analysis is:

- Feasible
- Illuminating
- Actionable

# Thank you!

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