A data-driven approach to stylistic identification

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Outline

Quantitative approaches to style

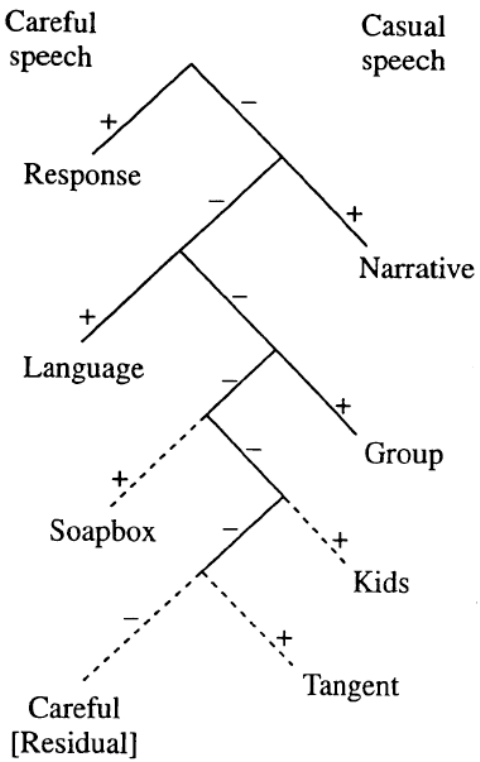
Top-down approaches

- Look for correlation of variation with pre-determined external factors
- Emphasis on topic, context, interlocutor, etc. as determining style

Bottom-up approaches

- Look for clustering of variables
- Emphasis on ordered sequences of observations

A top-down approach: Labov 2001



"As you listen to speech, set aside the first utterance of every **response** to yourself; then take every personal **narrative** and put it into the Casual speech bin; otherwise, exclude any discussion of **language**. Any **group** discussion not about language is Casual. Look for extended, **long-winded** general pronouncements and exclude them as Careful. Mark any discussion of **kids'** affairs, from their own point of view as Casual, and include any sizeable **excursion** of the speaker into a different topic. **Otherwise**, interview speech is classed as Careful speech."

Image from Labov 2001: 94

A top-down approach: Labov 2001

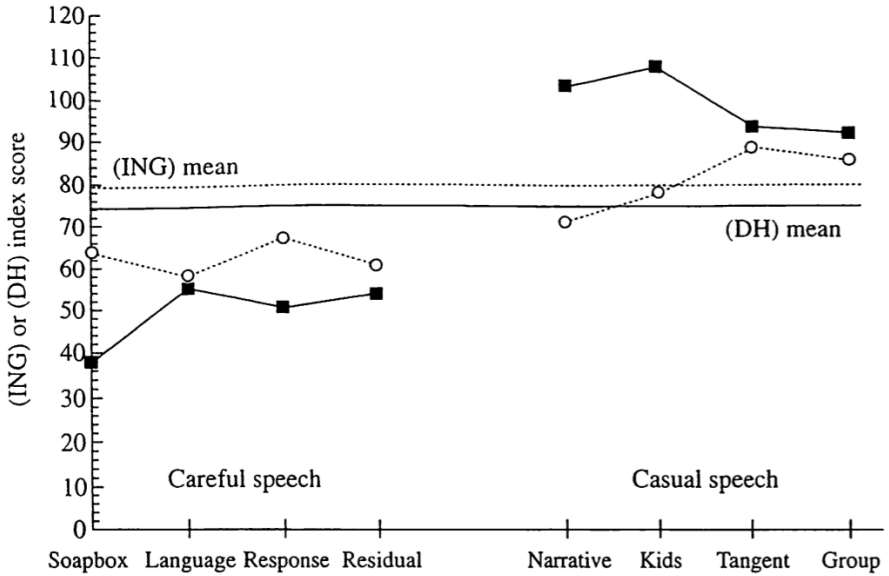


Image from Labov 2001: 104

New perspectives on style

- Increasing interest in how stylistic shifts take place in real time
- Attention to ordered sequences of observations
- See e.g. Podesva 2007, Sharma & Rampton 2011, Tamminga 2014

A bottom-up approach: Podesva 2007

Image excerpted from Podesva 2007 Fig. 2

A bottom-up approach: Podesva 2007

Image excerpted from Podesva 2007 Fig. 2

"It should be noted that clusters present themselves visually, and that as yet I have not developed a mathematical method for isolating clusters; doing so would be a useful direction for future work."

New bottom-up approaches to style

- Begin from the data itself
- Make style "fall out" of the data
- Automatically infer underlying states

New bottom-up approaches to style

Potential Advantages

- Automation: less labor-intensive, can apply to large datasets
- Statistical validity: not reliant on subjective judgment
- Temporal sensitivity: more adaptable to dynamic questions

The data

/dh/-stopping

- Philadelphia Neighborhood Corpus (Labov & Rosenfelder 2011)
- Sociolinguistic interviews with 42 white English speakers from the PNC
- 18,022 observations of /dh/-stopping coded auditorily in Praat

The data

/dh/-stopping

(‘them’) ∼ (‘dem’)

/ð/, /dð/ ∼ /d/, /ɾ/

The data

"So I went with them to the park..."

The data

"So I went with 0 to 1 park..."

The data

1101000110010111011001101100110111111000001110111111011111111...

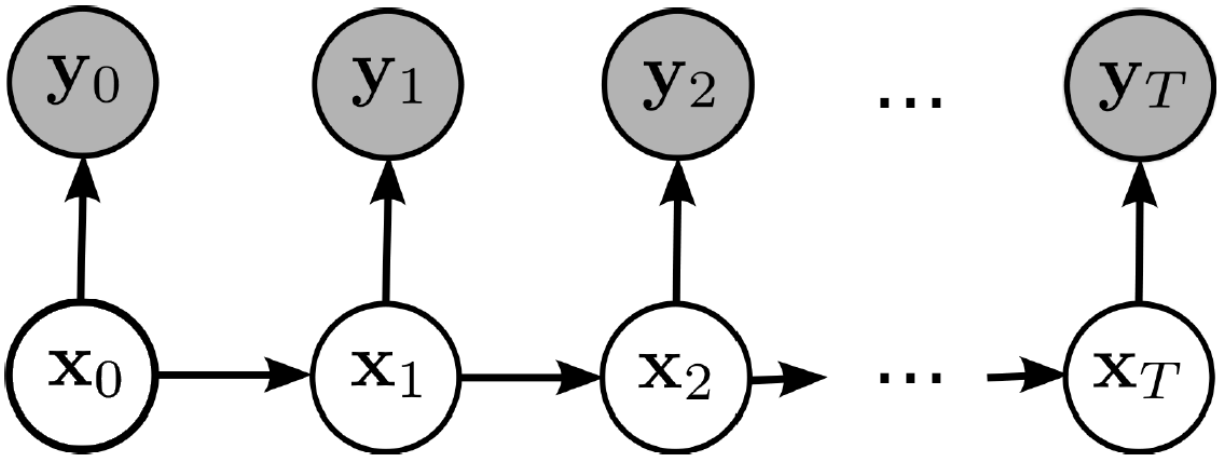
The data

Image excerpted from Podesva 2007 Fig. 2

The data

1101000110010111011001101100110111111000001110111111011111111...

Hidden Markov Model



Hidden Markov Model

Parameters

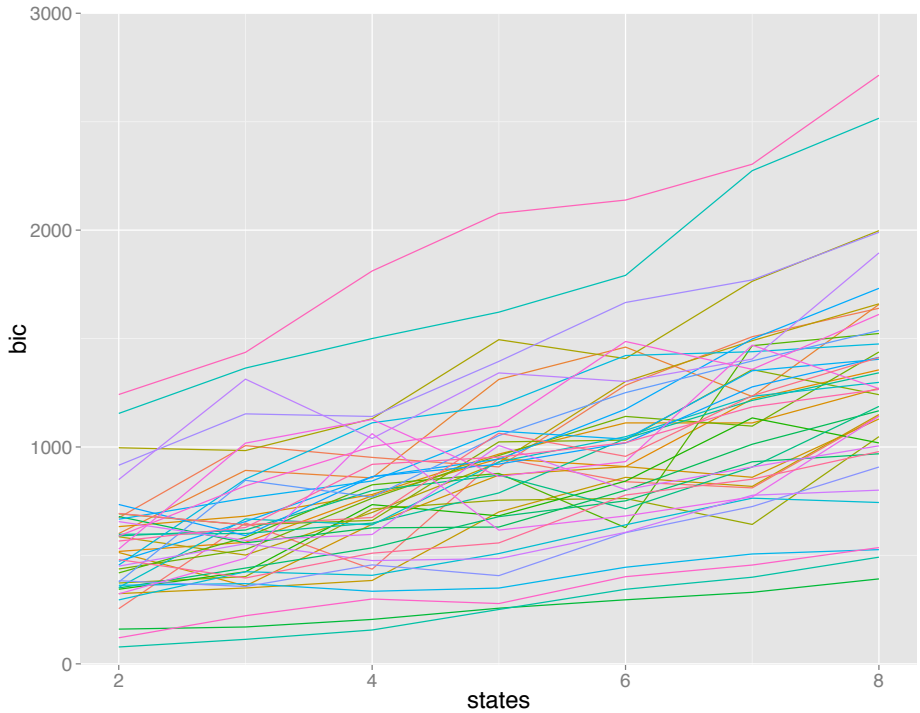
- Starting States: Probability of starting in a particular state
- Transition Matrix: Probability of transitioning from one state to another
- Emission Matrix: Probability of emitting a signal in a given state

Hidden Markov Model

Procedure (R: HMM)

- Initialize HMM: Specify starting transition and emission matrices
- Baum-Welch Algorithm: Fit parameters given the data
- Viterbi Decoding: Find most likely path through hidden states
- Model Comparison: Tradeoff between fit and complexity of model

Comparison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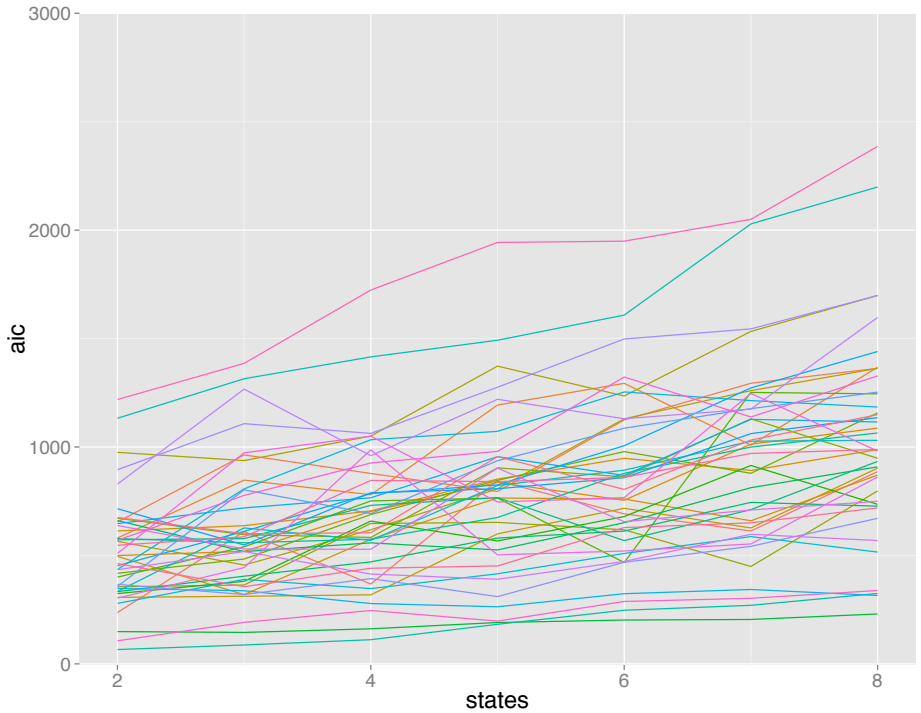
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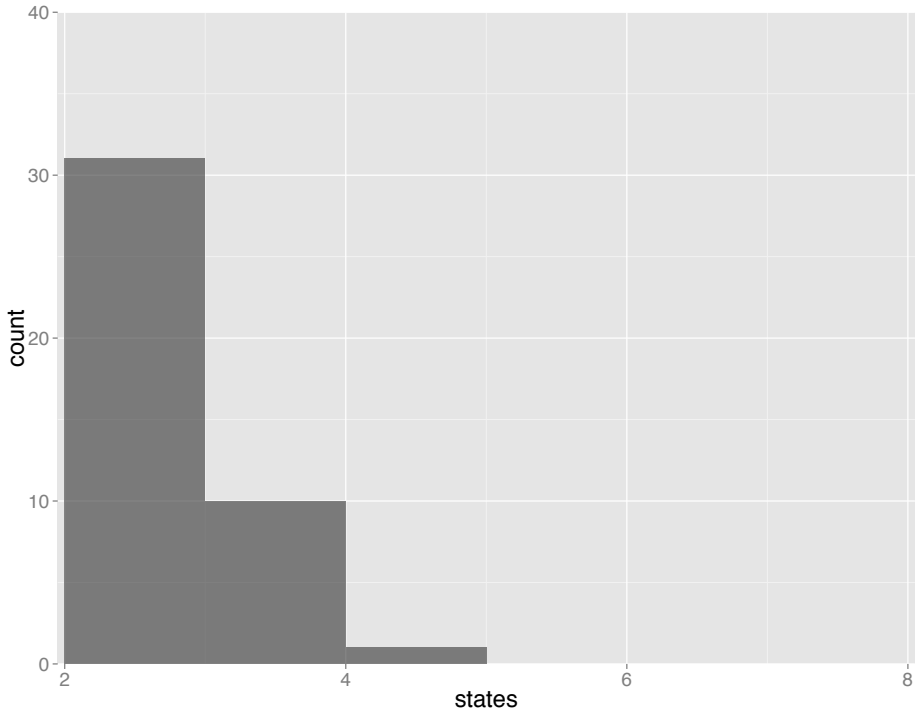
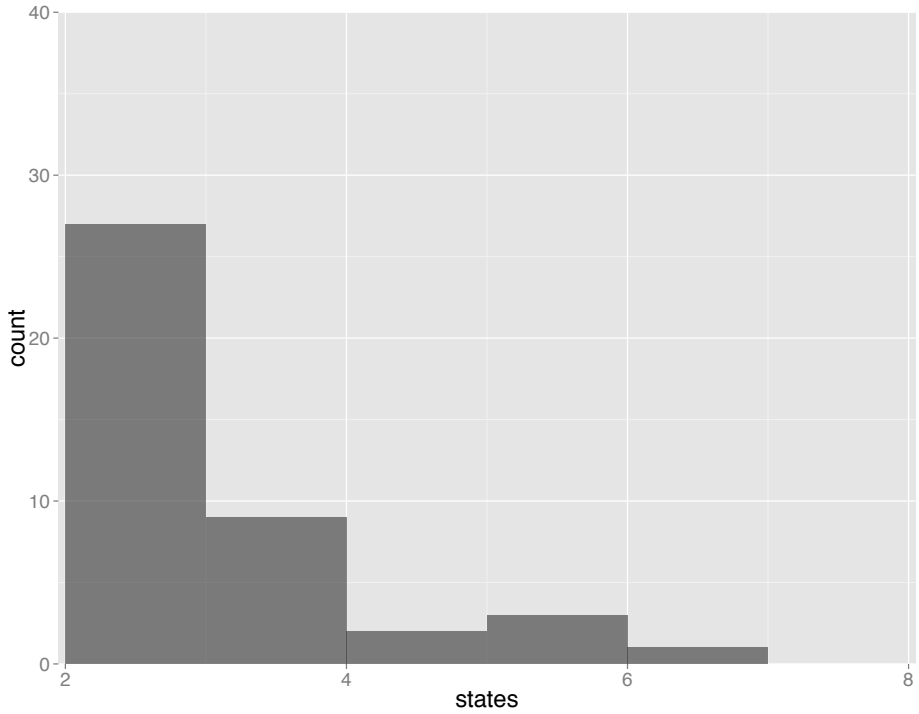
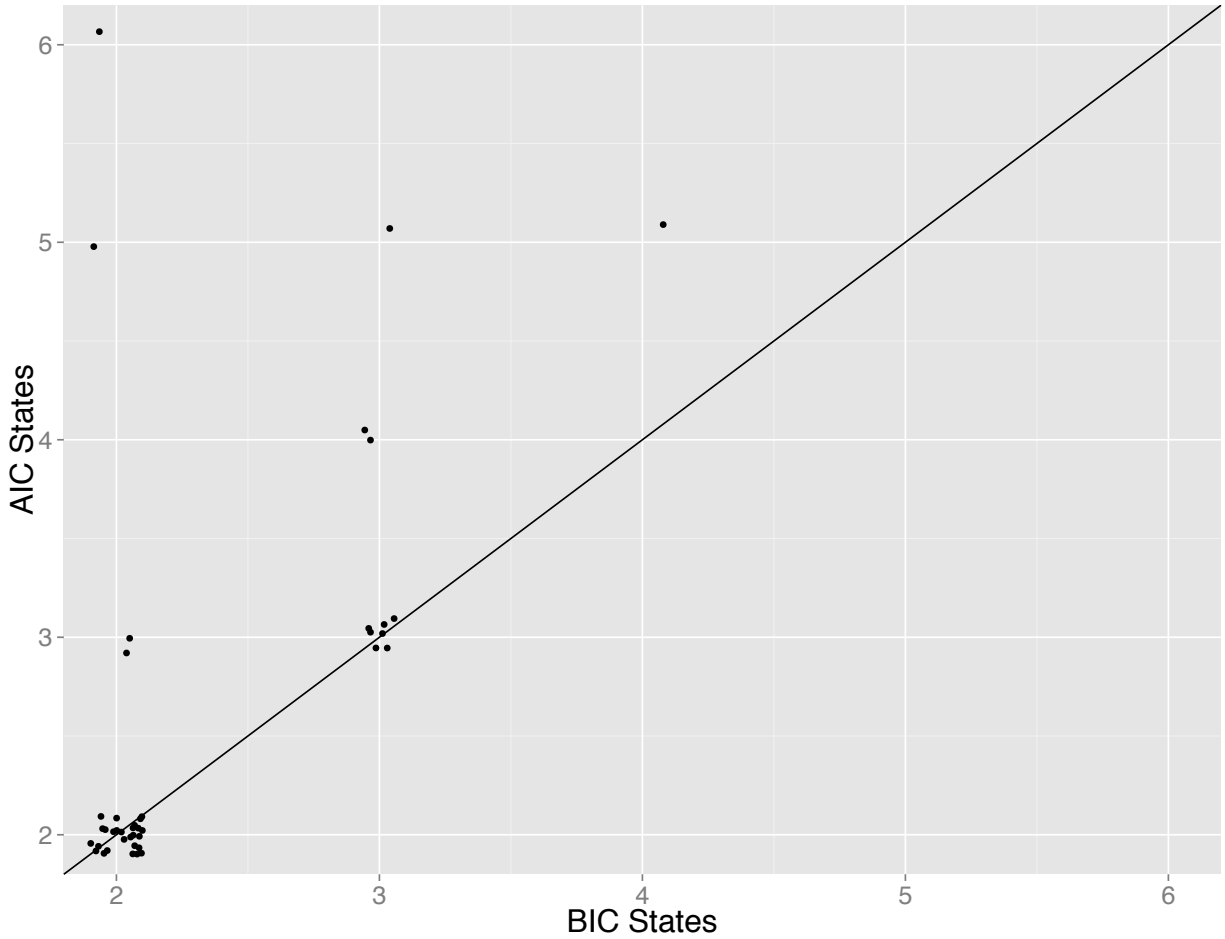




Differences



Main results

- Fit HMMs, found most likely path, compared models
- Two-state model fits most speakers best

Main results

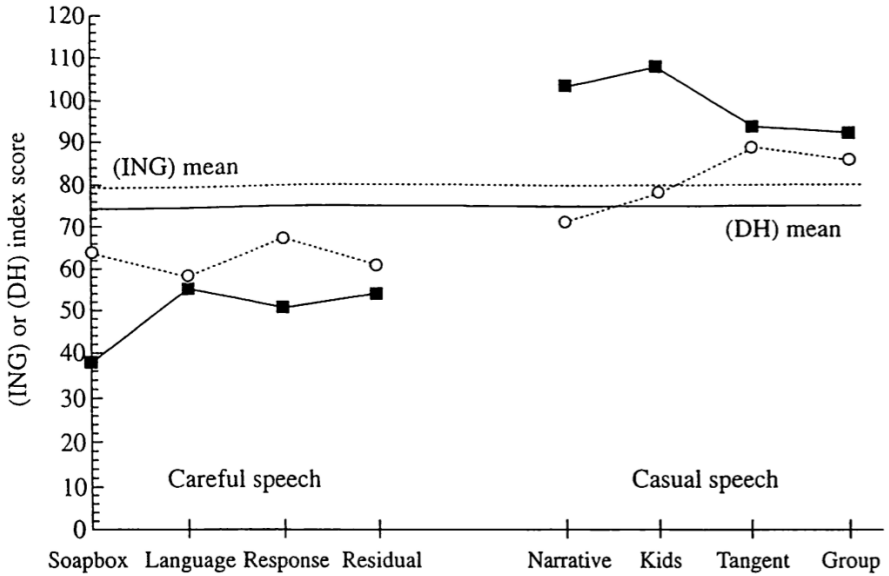


Image from Labov 2001: 104

Conclusions

- Pursue a bottom-up approach to identifying stylistic shifts
- Automatically extracted stylistic clusters from observed data
- Inferred state sequences can be used as input to a qualitative investigation

Future directions

Image excerpted from Podesva 2007 Fig. 2

Thanks!

Thanks!

- Students and Faculty at Penn, particularly Aaron Ecay
- Conference organizers
- Audience

References I

- Eckert (2003) The meaning of style
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- Labov & Rosenfelder (2001) The Philadelphia Neighborhood Corpus
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