The New Normal:
Multi-modal distributions signifying
loci of vocalic stylization

Janneke Van Hofwegen

LSA Annual Meeting
January 9, 2015
Third-wave variationism


“…variation does not simply reflect, but also constructs, social meaning.” (p. 87)

“The emphasis on stylistic practice in the third wave places speakers not as passive and stable carriers of dialect, but as stylistic agents, tailoring linguistic styles in ongoing and lifelong projects of self-construction and differentiation” (p. 97-98)
The emphasis on stylistic practice in the third wave places speakers not as passive and stable carriers of dialect, but as stylistic agents, tailoring linguistic styles in ongoing and lifelong projects of self-construction and differentiation” (Eckert 2012, p. 97-98)

Research Questions:

• To what extent are we both?

• How would this be exemplified in the data?

The prediction:

“Stylistic Norm”

“Stylistic Extreme”
Stylization as extreme-taking

Stylization is special...
Bakhtin (1986): “our speech…is filled with others’ words, varying degrees of otherness or varying degrees of ‘our-own-ness,’ varying degrees of awareness and detachment.” (p. 89)

Coupland (2007): *stylization* is the phenomenon of “…projecting personas, identities and genres other than those…current in the speech event…” (p. 154)

Bucholtz (2003): “it is only when we are surprised (emphasis added) out of our assumptions that we can truly appreciate the creative and innovative sociocultural work that social actors regularly accomplish with language.” (p. 407)

Stylization is a type of linguistic surprise.
Stylization as extreme-taking

Looking at linguistic data… how are linguistic surprises typically manifest?

Outliers

Discourse analysis:
Kiesling (2012): outliers are “noticeable tokens that highlight a speaker’s stance in interaction…more performative…metapragmatically highlighted.”

Quantitative variation analysis:
Podesva (2011): “If an axis of phonetic variation indexes a particular social meaning, then outliers on that axis can be understood as the strongest indicators of meaning.” (p. 254)

‘2α’ method (Leys et al. 2013): Tokens falling outside two standard deviations from the mean.
Outliers as instances of stylization

Van Hofwegen (2013): Vocalic outliers in Jock/Burnout speech
(NWAV42: Jocks and Burnouts Revisited)

Mean vowel formant values
non–normalized

Judy (Burnout)
(Eckert 1989, 2000)

Stylization

‘2α’ method

Pot

Stylization

Style

Stanford University
Outliers as instances of *stylization*

Van Hofwegen (2013)

<table>
<thead>
<tr>
<th>Vowel class</th>
<th>Outlier N</th>
<th>Non-outlier N</th>
<th>% of total tokens</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUT</td>
<td>13</td>
<td>181</td>
<td>6.70% †</td>
</tr>
<tr>
<td>BAT</td>
<td>11</td>
<td>150</td>
<td>6.83% †</td>
</tr>
<tr>
<td>BET</td>
<td>10</td>
<td>114</td>
<td>8.06% †</td>
</tr>
<tr>
<td>BAIT</td>
<td>7</td>
<td>147</td>
<td>4.55%</td>
</tr>
<tr>
<td>BIT</td>
<td>5</td>
<td>76</td>
<td>6.17% †</td>
</tr>
<tr>
<td>BEET</td>
<td>5</td>
<td>119</td>
<td>4.03%</td>
</tr>
<tr>
<td>BOT</td>
<td>10</td>
<td>119</td>
<td>7.75% †</td>
</tr>
<tr>
<td>BOUGHT</td>
<td>4</td>
<td>55</td>
<td>6.78% †</td>
</tr>
<tr>
<td>BOAT</td>
<td>20</td>
<td>219</td>
<td>8.37%</td>
</tr>
<tr>
<td>BOOT</td>
<td>0</td>
<td>38</td>
<td>0.00%</td>
</tr>
</tbody>
</table>

*In a normal distribution, tokens lying outside 2α comprise approximately 5% of the distribution.
† indicates vowels implicated in the Northern Cities Shift.
Thinking about distributions…

Multi-modal distributions

Stylization

Norm

Stylization

-3σ -2σ -1σ μ 1σ 2σ 3σ

13.6% 34.1% 34.1% 13.6%
This study: Vocalic stylization via multi-modal distributions

Hypotheses:

1) Intra-speaker vowel distributions along the F1 and F2 axes are not necessarily normal; in fact, they can be multi-modal.

2) Distributions on the outside edges of multi-modal distributions are loci for stylization.

3) Vowel classes most likely to vary multi-modally are also those carrying sociolinguistic salience. Specifically, vowel classes implicated in sound changes in progress are likely to be resources for extreme vocalic stylization for participants in those sound changes.
The speakers: Amanda (age 19) and Lynn (age 59)

2 white women
- Lifelong Redding residents
- Lower middle class
- High school educated

Crucially, different in age (CVS)

The California Vowel Shift (CVS)

Controlled sample, Lobanov normalized
Distribution analysis

• **ALL THE VOWELS!**
  Amanda: ~3,000 tokens
  Lynn: ~3700 tokens

• **Distribution analysis**
  • Relevant dimension (F1 or F2)
  • Shapiro-Wilk W test for normality
  • Best-fit distribution (AICc)

---

**All vowels, WF normalized**

---

Stanford University
### Distribution analysis: Amanda BAT F1

<table>
<thead>
<tr>
<th>Distribution</th>
<th>Mean (Hz)</th>
<th>St. Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>659</td>
<td>85</td>
</tr>
<tr>
<td>Mid</td>
<td>870</td>
<td>78</td>
</tr>
<tr>
<td>Low</td>
<td>1066</td>
<td>51</td>
</tr>
</tbody>
</table>

**Figure 5.** F1 distribution (Hz) of all BAT tokens (axis flipped)
Distribution analysis: Amanda BET F1

<table>
<thead>
<tr>
<th>Distribution</th>
<th>Mean (Hz)</th>
<th>St. Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>747</td>
<td>91</td>
</tr>
<tr>
<td>Low</td>
<td>798</td>
<td>19</td>
</tr>
</tbody>
</table>

Figure 5. F1 distribution (Hz) of all BET tokens (axis flipped)
Distribution analysis: Amanda BIT F1

<table>
<thead>
<tr>
<th>Distribution</th>
<th>Mean (Hz)</th>
<th>St. Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>526</td>
<td>43</td>
</tr>
<tr>
<td>Mid</td>
<td>616</td>
<td>38</td>
</tr>
<tr>
<td>Low</td>
<td>702</td>
<td>58</td>
</tr>
</tbody>
</table>

Figure 10. F1 distribution (Hz) of all BIT tokens (axis flipped)
So we have these extra modes...

How do we know that these extra modes are stylistic?
Orthogonal Quantitative Stylistic Variables

**Prosodic Prominence** (Mo 2008; Cole et al. 2010)
Composite measure for perceptual prominence for vowels.
- Duration (LogDuration)
- Spectral Emphasis – mid/low band-pass filtered intensity (dB)
- f0

**Creak** (Podesva 2007; Mendoza-Denton 2011)
- H1-H2
Post Hoc Logistic Regression Analysis - Amanda BAT F1

<table>
<thead>
<tr>
<th>Term</th>
<th>Estimate</th>
<th>Std. Error</th>
<th>Chi Square</th>
<th>Prob &gt; ChiSq</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept [high]</td>
<td>-0.705398</td>
<td>1.2312568</td>
<td>0.33</td>
<td>0.5667</td>
</tr>
<tr>
<td>Intercept [low]</td>
<td>-0.101679</td>
<td>1.2310335</td>
<td>0.01</td>
<td>0.9342</td>
</tr>
<tr>
<td>Spectral emphasis</td>
<td>-0.06516</td>
<td>0.0199805</td>
<td>10.64</td>
<td>0.0011**</td>
</tr>
<tr>
<td>f0</td>
<td>0.00440255</td>
<td>0.0019137</td>
<td>5.29</td>
<td>0.0214*</td>
</tr>
<tr>
<td>logDuration</td>
<td>-0.987261</td>
<td>0.1855498</td>
<td>28.31</td>
<td>&lt; 0.0001***</td>
</tr>
<tr>
<td>Spectral emphasis * logDuration</td>
<td>0.11107708</td>
<td>0.0284555</td>
<td>15.24</td>
<td>&lt; 0.0001***</td>
</tr>
</tbody>
</table>

Stanford University
# Post Hoc Linear Regression Analysis - Amanda BET F1

Table 4. Linear mixed effects regression results for prosodic prominence factors predicting BET F1

<table>
<thead>
<tr>
<th>Term</th>
<th>Estimate</th>
<th>Std. Error</th>
<th>Denominator DF</th>
<th>t Ratio</th>
<th>Prob &gt; [t]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>779.85259</td>
<td>46.95437</td>
<td>413.7</td>
<td>16.61</td>
<td>&lt; 0.0001***</td>
</tr>
<tr>
<td>Spectral emphasis</td>
<td>2.357347</td>
<td>0.685911</td>
<td>393.7</td>
<td>3.44</td>
<td>0.0007***</td>
</tr>
<tr>
<td>f0</td>
<td>0.067362</td>
<td>0.057283</td>
<td>403.5</td>
<td>7.49</td>
<td>0.2403</td>
</tr>
<tr>
<td>logDuration</td>
<td>60.204408</td>
<td>8.038251</td>
<td>432.8</td>
<td>1.18</td>
<td>&lt; 0.0001***</td>
</tr>
</tbody>
</table>
Table 5. Logistic regression results for prosodic prominence factors predicting BIT F1 distribution

<table>
<thead>
<tr>
<th>Term</th>
<th>Estimate</th>
<th>Std. Error</th>
<th>Chi Square</th>
<th>Prob &gt; ChiSq</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept [high]</td>
<td>3.93188819</td>
<td>0.8738241</td>
<td>20.25</td>
<td>&lt; 0.0001***</td>
</tr>
<tr>
<td>Intercept [low]</td>
<td>4.68365416</td>
<td>0.8791591</td>
<td>28.38</td>
<td>&lt; 0.0001***</td>
</tr>
<tr>
<td>Spectral emphasis</td>
<td>-0.0839525</td>
<td>0.0151097</td>
<td>30.87</td>
<td>&lt; 0.0001***</td>
</tr>
<tr>
<td>H1-H2</td>
<td>-0.0312082</td>
<td>0.0091156</td>
<td>11.72</td>
<td>0.0006***</td>
</tr>
<tr>
<td>f0</td>
<td>0.0021474</td>
<td>0.0013755</td>
<td>2.44</td>
<td>0.1185</td>
</tr>
<tr>
<td>logDuration</td>
<td>0.23552492</td>
<td>0.127198</td>
<td>3.43</td>
<td>0.0641</td>
</tr>
</tbody>
</table>

Figure 12. H1-H2 by BIT F1 distribution.
Figure 13. Spectral emphasis (0-500Hz) by BIT F1 distribution.
Distribution analysis: Lynn BAT F1
Distribution analysis: Lynn BET F1
Distribution analysis: Lynn BIT F1 & F2

F1 distribution (BIT)

F2 distribution (BIT)
Results Summary

Amanda (19 years; CVS participant):
BAT – trimodal distribution (F1); normal distribution (F2)
BET – bimodal distribution (F1); normal distribution (F2)
BIT – trimodal distribution (F1); normal distribution (F2)

Orthogonal measures predict certain modes in these distributions.

Lynn (59 years; CVS non-participant):
BAT – bimodal distribution (F1); normal distribution (F2)
BET – normal distribution (F1); normal distribution (F2)
BIT – bimodal distribution (F1); trimodal distribution (F2)
Conclusion

**Theoretical**
Stylization is an agentive act of extreme-taking out from a (more) passive stylistic norm.

These acts of extreme-taking are more likely to occur for features that are sociolinguistically salient for a particular community.

**Methodological**
Quantitative methods can be used as bottom-up approaches for identifying potential stylization patterns in speech data.
- Distribution analysis (continuous, uni-dimenional data)
- Prosodic prominence and creak

Pick your measure!
Thank You!

Many thanks to Rob Podesva, Penny Eckert, and Tom Wasow for their guidance, support, and feedback in the process of writing this up as a qualifying paper.
References


