More than Pitch Perfect

A LONGITUDINAL STUDY OF TWO TRANSGENDER VIDEO BLOGGERS

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Acoustic correlates of gender

But it’s much more than pitch! (Cameron & Kulick 2003)
Breaking the binary

Gender is a performance (Eckert & McConnell-Ginet 2003), and this includes any speech behaviors that index gender.

Most research on language and gender focuses on the difference between men and women.

Two (social and methodological) problems:

- Historically has assumed a male default; now assumes a gender binary
- perpetuating invisibility of transgender and non-binary people (Davis 2014)
Transgenderism

To be transgender is to identify as a different gender from the one assigned to you at birth
- Trans men (female to male, FTM): assigned female at birth, socialized to be female, and currently self-identify as male
  - (Famous examples: Chaz Bono, Ian Harvie, Schuyler Bailar)
- Trans women (male to female, MTF): assigned male at birth, socialized to be male, and currently self-identify as female
  - (Famous examples: Janet Mock, Laverne Cox, Caitlyn Jenner, Jazz Jennings)

Transgender people may or may not pursue medical intervention to achieve their trans identity.
- Trans men may take testosterone to lengthen the vocal cords, grow facial hair, etc.
- Trans women may take estrogen to feminize their body, but *this won’t shorten their vocal cords or otherwise raise f0*
- Both may or may not undergo genital reconstruction surgery
Few studies of transgender voices

Most research is clinical: case studies of transgender people undergoing hormone replacement therapy or directed vocal training

Or, perception studies that compare voices of trans people to voices of cisgender people

We want to study transgender individuals outside the clinical setting
  ◦ Important for personal identity to be perceived as female-sounding
  ◦ But not part of a treatment program specifically targeting their voice

  ◦ Better for visibility by focusing entirely on the community/individuals, rather than comparing trans men to the default (cis men)
Hypotheses: To index femininity...

- Pitch (f0)
- Pitch range
- Vowel quality
- Vowel duration
- Sibilant center of gravity
- Sibilant duration
- Word-final stop release
- Prosodic structure
- Phonation
Two YouTube “vloggers”

Grishno (GN)

   Community organizer, activist, from Utah

   Recording YT videos since 2006

Princess Joules (JV)

   Model, makeup artist, from Toronto

   Recording YT videos since 2010

Both women have undergone top/bottom surgery and hormone replacement therapy, but neither has undergone vocal feminization surgery
Methodology

Transcribed 14 videos of GN from 2007-2017
Transcribed 9 videos of JV from 2011-2017
Forced-aligned using PFA (Rosenfelder et al. 2011)
Formants, duration, and f0 measured with ifcformant
  ◦ Duration normalized for local speaking rate by dividing raw vowel duration by syllables/sec
Analysis 1: mean values of a variable for each video, compared across chronological time
Analysis 2: mean values of a variable for equal-length bins over the duration of each video
Pitch (f0)

Cisgender women’s average pitch range: 165-255 Hz
Cisgender men’s average pitch range: 85-180 Hz
Testosterone therapy will lower average pitch; estrogen therapy will not

H: Transgender women may increase their average f0 over time
H: Trans women’s pitch may fluctuate throughout a discourse
Pitch change over chronological time

f0 over time

p=0.0048**

p=0.1777
Pitch change over video duration

f0 over video duration (30 equal bins)

| 2014-08-12 | 2015-03-30 | 2015-04-24 | 2016-08-23 | 2017-03-24 |
| 2017-05-26 | 2017-08-17 | 2017-12-05 |          |          |

(GN) p=0.1164
(JV) p=0.00035***
Vowel Quality (F1, F2)

Women have “wider” vowel spaces, greater F1 and F2 (due in part to shorter vocal tract length)

Higher F1 and F2 (fronted, lowered vowels) are socially associated with femininity

H: Trans women may increase their F1/F2 over time

H: Trans women may increase their vowel duration over time
F1/F2 change over chronological time

\begin{align*}
\text{(GN) } p &= 0.3094 \\
\text{(JV) } p &= 0.412 \\
\text{(GN) } p &= 0.00093^{***} \\
\text{(JV) } p &= 0.1808
\end{align*}
F2 of /u/ change over chronological time

\[ /u/ \text{ F2 over time} \]

\[ \text{Hz} \]

\[ \text{p}=0.0027^{**} \]

\[ \text{p}=0.0045^{**} \]

\[ \text{CA} \]

\[ \text{NY} \]
Vowel Duration

Unrelated to pitch

May be part of a feminine “feature bundle”

H: Trans women may increase their vowel duration over time
Vowel duration change over chronological time

vowel duration over time

sec (sr norm)
Vowel duration change over video duration

vowel duration over video duration (30-sec bins)

(GB) p=0.1652
(JV) p<0.001***
Sibilant Duration

Woman have “somewhat” longer sibilants

H: Trans women may increase their sibilant duration over time
Sibilant duration change over chronological time

![Graph showing sibilant duration over time]

- (GN) /s/ p=0.044 *
- (JV) /s/ p=0.093
- (GN) /z/ p=0.096
- JV /z/ p=0.052
Sibilant duration change over video duration

\[ \text{[s] duration over video duration (equal bins)} \]

(GN) /s/ \( p = 0.7114 \)
(JV) /s/ \( p = 0.06892 \)
## Hypotheses revisited

<table>
<thead>
<tr>
<th>Feature</th>
<th>Hypothesis</th>
<th>Y/N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pitch (f0)</td>
<td>H: Transgender women may increase their average f0 over time</td>
<td>Y N</td>
</tr>
<tr>
<td>Pitch range</td>
<td>H: Trans women’s pitch may fluctuate throughout a discourse</td>
<td>Y N</td>
</tr>
<tr>
<td>Vowel quality</td>
<td>H: Trans women may increase their F1/F2 over time</td>
<td>Y N</td>
</tr>
<tr>
<td>Vowel duration</td>
<td>H: Trans women may increase their vowel duration over time</td>
<td>N</td>
</tr>
<tr>
<td>Sibilant duration</td>
<td>H: Trans women may increase their sibilant duration over time</td>
<td>N</td>
</tr>
<tr>
<td>Word-final stop release</td>
<td>O: JV certainly does a lot of this, but change over time? TBD</td>
<td></td>
</tr>
<tr>
<td>Prosodic structure</td>
<td>O: “ ”</td>
<td></td>
</tr>
<tr>
<td>Phonation</td>
<td>O: GN is very creaky, hard to tell if related to gender performance</td>
<td></td>
</tr>
</tbody>
</table>
Conclusions

Moreso than cisgender individuals, transgender individuals may not “fit” within average ranges for certain vocal characteristics for their gender, even after years of transitioning.

- The awesome thing is that they don’t have to!

For GN, female-indexing vocal traits are increasingly not present in her voice over time

- Is something else rising to index femininity?
- Or might a trans person who has spent years in transition “relax” the performance of female gender?

For JV, her voice has not appeared to change significantly over time in most dimensions.

- However, her voice appears to fluctuate regularly over the course of a video: at beginning and end, higher f0, longer vowels, longer sibilants (?) – related to the performance of gender and personal awareness of audience?

Further analysis: individual videos and instances of pitch variability (etc.) that may depend on the topic of the video; combing semantic content for the discursive construction of identity in monologues (Bucholtz & Hall 2005)
References


Ingrid Rosenfelder, Joe Fruehwald, Keelan Evanini, and Jiahong Yuan (2011). FAVE (Forced Alignment and Vowel Extraction) Program Suite. URL http://fave.ling.upenn.edu


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