Phonetic, phonological, and social forces as filters

Another look at the *Gorgia Toscana*

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What is *Gorgia Toscana*?

- Occurs in several central Italian dialects
- Results in pronunciation of /p/, /t/, and /k/ as [ɸ], [θ], and [x/h] between sonorants (Vogel 1997)
  
  *but other surface realisations are observed*

- Applies to voiced stops (Giannelli & Savoia 1978)
<table>
<thead>
<tr>
<th>Word</th>
<th>Pronunciation</th>
<th>Pronunciation</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>poco</td>
<td>/poko/</td>
<td>[poxo]</td>
<td>“little”</td>
</tr>
<tr>
<td>vita</td>
<td>/vita/</td>
<td>[viθa]</td>
<td>“life”</td>
</tr>
<tr>
<td>topo</td>
<td>/topo/</td>
<td>[toφo]</td>
<td>“mouse”</td>
</tr>
<tr>
<td>prego</td>
<td>/prego/</td>
<td>[preyo]</td>
<td>“beg (1st s.)”</td>
</tr>
<tr>
<td>modo</td>
<td>/modo/</td>
<td>[moďo]</td>
<td>“manner”</td>
</tr>
<tr>
<td>la bica</td>
<td>/labika/</td>
<td>[laβixa]</td>
<td>“the bale”</td>
</tr>
</tbody>
</table>
Research questions

- How can we account for *Gorgia Toscana’s* historical innovation?
- eventual spread to featurally-similar segments?
- greater occurrence with velars?
- gradient output?
- intersubject variation?
with categorical rules?

Prosodic rule for *Gorgia Toscana*
Nespor and Vogel (1986: 207)

- cont
- voi
- delayed release

\[ \text{[ + cont]} / \text{[...[-cons] ___ [-cons]...]}_1 \]
by reference to Laziness?

Weak position, level A (effort cost of p, t, k = 85; effort cost of φ, θ, x = 70) (Kirchner 1998: 274)

<table>
<thead>
<tr>
<th></th>
<th>LAZY$_{75}$</th>
<th>*-strid, +cont, +cons</th>
<th>PRES (cont)</th>
</tr>
</thead>
<tbody>
<tr>
<td>p, t, k - p, t, k</td>
<td>* !</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\not!$ p, t, k - φ, θ, x</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
</tbody>
</table>
with more allophonic categories?

Marotta (2001)
- voiceless stops surface as
  - stops
  - semi-fricatives
  - fricatives
  - deleted segments (/k/)
- voiced stops surface as
  - stops
  - fricatives
  - approximants

Sorianello (2001)
- voiceless stops
- unreleased voiceless stops
- devoiced voiced stops
- voiced stops
- voiceless fricatives
- voiced fricatives
- approximants
- deleted segments

Giannelli and Savoia (1978)
**THIRTY-ONE** allophones of underlying /p,t,k/!
with sociolinguistic constraints?

(Giannelli & Savoia 1978 - “Rule 18”)
in a more integrated way?

Consider multiple forces working to encourage or inhibit sound change:

- maintenance of perceptual contrast
- articulatory difficulty
- simplicity of cognitive representations
- social marking and group association
1. Historical innovation and spread

Izzo (1972)

<table>
<thead>
<tr>
<th></th>
<th>&lt;1525</th>
<th>c. 1780</th>
<th>present day</th>
</tr>
</thead>
<tbody>
<tr>
<td>only</td>
<td>only</td>
<td>non-velars</td>
<td>all stops</td>
</tr>
<tr>
<td>velars</td>
<td>begin</td>
<td>leniting</td>
<td>lenite, with preference</td>
</tr>
<tr>
<td>lenite</td>
<td></td>
<td></td>
<td>for /k/</td>
</tr>
</tbody>
</table>
2. Synchronic patterns

Villafañá Dalcher (2006)

- Six native speakers of Florentine Italian
- 1020 tokens (/p,t,k,b,d,g/) in VCV contexts
- Elicited via sentence reading
- Acoustic measurements:
  - constriction and VOT durations; periodicity and intensity during constriction; release burst absence
- Latent variable extraction results in an L score for each token

(Lavoie 2001; Lewis 2001)
2a. Affected sounds

All stops lenite, but velars are most prone to weakening
2b. Gradience

L scores fall at all points along a continuum.
2c. Categoricity

but /k/ seems to approach categorical deletion

Std. Dev = 1.28
Mean = .6
N = 227.00
2d. Variation

individuals lenite different consonants to varying extents
Research questions (redux)

- How can we account for *Gorgia Toscana’s* historical innovation?
- eventual spread to featurally-similar segments?
- greater occurrence with velars?
- gradient output?
- intersubject variation?
Is Gorgia Toscana...

- Physiologically motivated?
- Perceptually motivated?
- Phonologically motivated?
- Socially motivated?
- All of the above?
A filtering model’s ingredients

PERCEPTION
- audition
- recognition

PRODUCTION
- coordination
- aerodynamics

GENERALIZATION
- cognitive
- categories

CONFORMITY
- communication
- society

(Hume & Johnson 2001)
How do the filters work on $p$?

- Perception
  *discourages alterations if they reduce contrast*

- Production
  *encourages alterations that are articulatorily simpler*

- Generalization
  *simplifies cognitive representations*

- Conformity
  *brings $p$ into line with linguistic community’s norms*
Perception (1)

- Phoneme inventory
  - Presence of labiodental fricatives
  - Lack of velar fricatives

<table>
<thead>
<tr>
<th>Bilabial</th>
<th>Labiodental</th>
<th>Dental</th>
<th>Alveolar</th>
<th>Post-alveolar</th>
<th>Palatal</th>
<th>Velar</th>
<th>Labio-Velar</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>f</td>
<td>v</td>
<td>s</td>
<td>Z</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>∫ (3)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Perception (2)

- Maintenance of contrast in non-velars
  - distribution of energy differs in lenited /p/ and /t/

![Graphs comparing /θ/ and /φ/ sound pressure levels across frequency](image-url)
The perception filter and GT

- Dispreference for non-velar lenition
- But lenition of all stops still permitted
Production (1)

- Gradual, not categorical, reduction in constriction degree/duration when articulators are identical (Browman & Goldstein 1990)
- Reduction of articulatory effort (Kirchner 1998)

Tongue body:
- Narrow pharyngeal
- Closure velar
- Narrow pharyngeal

Glottis:
- Narrow
- Wide
- Narrow

/ a k a /
Janda and Joseph (2003: 206)

- “sound change originates in a very ‘small,’ highly localized context over a relatively short temporal span”
- “purely phonetic conditions govern an innovation at this necessarily somewhat brief and limited point of origin”

Izzo (1972)

<1525

multiple references to velar lenition only

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c. 1780

first reference to lenition of /p/ and /t/
The production filter and GT

- Velars more susceptible (synchronously)
  they share common articulators with surrounding vowels

- *Gorgia Toscana* assumes infinite forms
  minor fluctuations in acoustic dimensions
  are the result of minor fluctuations in articulator motions

- Velars lenited first (historically)
Generalisation (1)

_Gorgia Toscana_ affects all oral stops

- Exaggeration (Janda 2000)
- Phonologisation (Hyman 1977)
- Symmetry (Hayes 1997)

Phonetically-motivated sound changes spread throughout a natural class.
Hayes (1999: 253-54)

- ...constraints are typically natural, in that the set of cases they ban is phonetically harder than the complement set.

- Phonological constraints tend to ban phonetic difficulty in simple, formally symmetrical ways.
The generalisation filter and GT

- Delayed spread from velars to non-velars
- Synchronic weakening of all stops in inventory
- Possible phonologisation of /k/ weakening
Conformity (1)


- “In...Florence, the spirants also carry high status... there is no negative judgment conferred on their use”
- /k/ lenition a “stereotypical marker of regional association”
- Non-Florentine Italians more aware of /k/ lenition than of /p/ and /t/ lenition
- Unlenited /k/ a possible marker of “Italianness”
Conformity (2)

Villafaña Dalcher (2006)

- Stereotypical /k/ lenition not present for all subjects

Subjects F1 and M1 lenite /k/ significantly more than other subjects, who seem to suppress /k/ lenition.
Conformity (3)

Interesting, when we look at certain social characteristics of the subjects...

<table>
<thead>
<tr>
<th>subject</th>
<th>higher education</th>
<th>white-collar employment</th>
<th>second language(s)</th>
<th>international travel</th>
<th>domestic travel</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>F2</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>F3</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>M1</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>M2</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>M3</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>
The conformity filter and GT

- Prestige of velar lenition in limited geographical area
- Encouragement of velar lenition for subjects with “Florentine” identity
- Suppression of velar lenition for subjects with “Italian” identity
Example - /k/

**Perception:** n/a

**Production:** gestural reduction

**Generalization:** phonologization

**Conformity:** stigma avoidance, prestige attainment

Arrow directions indicate the flow of processes or influences related to the phoneme /k/ in the example.
Example - /p/

- **Perception**
  - contrast preservation

- **Production**
  - n/a

- **Generalization**
  - symmetry

- **Conformity**
  - n/a
Conclusions

- Accounts for observations
  - Historical innovation of velar lenition
  - Eventual spread to natural class
  - Greater susceptibility of velars
  - Gradient nature of lenition
  - Intersubject variation in /k/ lenition

- Accounts for general variation in the output
  - within a narrowly-defined time scale
  - constant interactions among filters

- Language specificity
  - Filters influenced by Italian sound system
[finiho] << /finito/ ‘finished’

Thank you.
References


References


Kirchner, R. 2004. “Consonant lenition.” In Hayes, Kirchner, and Steriade (Eds.), Phonetically Based Phonology. Cambridge: CUP.

