Testing the listener-driven model of dissimilation

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Dissimilation

• Two similar segments in close proximity; one changes to become less similar

<table>
<thead>
<tr>
<th>Latin:</th>
<th>Italian:</th>
</tr>
</thead>
<tbody>
<tr>
<td>kwinkwe</td>
<td>'tʃiŋkwe</td>
</tr>
<tr>
<td>kwindekim</td>
<td>'kwinditʃi</td>
</tr>
<tr>
<td></td>
<td>cinque</td>
</tr>
<tr>
<td></td>
<td>‘five’</td>
</tr>
<tr>
<td></td>
<td>quindici</td>
</tr>
<tr>
<td></td>
<td>‘fifteen’</td>
</tr>
</tbody>
</table>

• Two competing explanations (Garrett & Johnson 2013)
  – Motor planning errors
  – Listener error
Dissimilation as listener error

- Ohala (e.g. 1981): Listeners are good at restoring a distorted auditory signal

Ohala 1981:182
Dissimilation as listener error

- Dissimilation is overzealous reconstruction

Speaker
/kwinkwe/

(distorted by vocal tract)

[kwinkwe] heard as [kwinkwe]

Listener
/kinkwe/

reconstructed as
Ohala & Shriberg (1990)

“I will now say the word /b_b/”

- With LP filter: listeners occasionally misidentified /u/ as /i/

Listenners assume this energy is missing from signal
Abrego-Collier (2013)

In summary, significant effects are found when the conditioning consonant in the word is /l/ versus when there was no second liquid in the word. The probability plot illustrates that overall, listeners are more likely to judge the target consonant to be /l/ when there is another /l/ in the word, meaning that listeners perceptually assimilate the target to the trigger. The presence of /l/ causes continuum liquids to be identified as /l/ more often than in the control condition.

At the far right end of the continuum only, when the target was most clearly /l/-like, the predicted trajectory in Figure 1 seems to show that listeners were more likely to identify the target as /r/ when the trigger was /l/ than in the baseline condition. Thus, in a limited number of cases, /l/ caused listeners to perceptually dissimilate.

4 Discussion

4.1 Listener (mis)perception patterns of liquid-to-liquid coarticulation

The experimental findings, especially the interaction effect of CONDITION / TARGET, at least partially support the general expectation under the assumptions of the listener/misperception paradigm, that the presence of two liquids causes assimilation to the trigger /l/. This will be discussed further in Section 4.
Dissimilation and prosody

• Dissimilation more common in weak contexts
  – Motor planning Garrett & Johnson 2013:22
  – Listener difficulty Hall 2009:26

• Possible role of prosody in dissimilation is untested
Experiment 1: Aims

• Is dissimilation due to listener hyper-correction?
• Does prosodic prominence play a role?
• [+labial]

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Experiment 1: Stimuli

11-step [kw...k] + [anto] =

kwanto “how many” ... kanto “I sing”

Following word

*Ho detto _____ quattro volte* “I said ___ 4 times”

*Ho detto _____ sette volte* “I said ___ 7 times”

Accent

*Ho DETTO _____ quattro volte*

*Ho DETTO _____ sette volte*
Experiment 1: Task & Analysis

- 360 stimuli
- 2AFC
- 15 Italian listeners
- lmer in R
  - DV: Listener response
  - FF: Following word, Accent
  - RF: individual listener
Experiment 1: Hypotheses

H1: Dissimilation
- More “canto” responses preceding *quattro* than *sette*

H2: Prosodic prominence
- Stronger effect in deaccented contexts
Results: Following word

Proportion “quanto” responses

continuum step /kw/-/k/

Quattro
Sette
Results: Accent

Proportion “quanto” responses

continuum step /kw/-/k/

- Accented
- Deaccented
Experiment 1: Summary

✗ H1: Dissimilation
    Listener responses not affected by upcoming similar segment

✗ H2: Prosodic prominence
    - No effect of accent on listener responses
Experiment 1: Discussion

H1: Dissimilation
Listener responses not affected by upcoming similar segment

...for “Latin quinque > Italian cinque, we require evidence that the vowel intervening between the labio-velars /kʷ...kʷ/ was rounded by these consonants” (Ohala 1981:192)
Experiment 2: F2 lowering

[kw...k] + anto

Quanto_{experiment1}

[kw...k] + anto_{lowF2}

Quanto_{lowF2}
Experiment 2: Stimuli, task, predictions

Listeners heard:

**In isolation:**

\[ \text{quanto} \ldots \text{canto} \]

\[ \text{quanto}_{\text{lowF2}} \ldots \text{canto}_{\text{lowF2}} \]

...Bias towards “quanto” with lowered F2

**In carrier phrase:**

\[ \text{Ho detto} \ \text{quanto}_{\text{lowF2}} \ldots \text{canto}_{\text{lowF2}} \ \text{quattro volte} \]

...Bias should disappear

\[ \text{Ho DETTO} \ \text{quanto}_{\text{lowF2}} \ldots \text{canto}_{\text{lowF2}} \ \text{quattro volte} \]

Similar to Experiment 1

- 2AFC quanto/canto
- 270 stimuli
- 24 Italian listeners; here n=13
Results: Isolated words

- Expected shift towards more "quanto" with F2 lowering
Results: Sentences

- No change in listener responses before another /kw/
- Significantly more “canto” in deaccented context
Experiment 2: Summary

In isolation:

\textit{quanto}... \textit{canto}

\textit{quanto}_{lowF2}... \textit{canto}_{lowF2}

...Bias towards “quanto” with lowered F2

Sentence context:

\textit{Ho detto} \textit{quanto}_{lowF2}... \textit{canto}_{lowF2} \textit{quattro volte}

...Bias should disappear

\textit{Ho DETTO} \textit{quanto}_{lowF2}... \textit{canto}_{lowF2} \textit{quattro volte}

Significant shift towards “canto”
Summary Experiment 1 & 2

• Is dissimilation of /kw...kw/ due to listener hypercorrection?
  – No; no evidence that listeners ‘undo’ labialization from first /kw/

• Does prosodic prominence play a role?
  – Yes. Deaccented contexts favour “k”

• So how do we explain quinque > cinque?
Explaining dissimilation in *quinque*

**Quinque**
- Cues to /kw/ might be distributed over the word (cf. Boyce 1989)
  - Initial /kw/ locally weak
  - Presence of initial /kw/ indicated by downstream /kw/
- Deaccented position might attenuate distributed cues
- Would lead to /kinkwe/
Explaining dissimilation

Quindici
• Initial /kw/
  – Must be fairly precise (no cues to /kw/ downstream)
• Deaccented position might only attenuate distributed cues

• ...would remain stable over time
Explaining dissimilation

Speaker
/kwinkwe/

(distorted by vocal tract)

[kwinkwe] heard as [kwinkwe]

Listener
/kinkwe/

reconstructed as


References


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