An auditory masked priming study of nasal substitution in Dabaw Bisaya (Cebuano)

Jed Sam PIZARRO-GUEVARA • Department of Linguistics, University of California, Santa Cruz

RESEARCH QUESTIONS & MAIN FINDINGS

Can we use spoken presentation to study morphological priming?
Yes! Consistent with visual presentation, there was priming for identity and morphologically related forms whose roots are transparent.

Does nasal substitution (NS) interfere with lexical access?
Possibly, but not yet conclusive. There was no evidence for priming for forms that have been rendered opaque by NS.

1. Nasal substitution in Dabaw Bisaya (DB)
   - **Cebuano** is an Austronesian language spoken in the central and southern parts of the Philippines.
   - **Dabaw Bisaya** is the variety spoken in Davao City.
   - **Nasal substitution (NS)** is a phenomenon where the final nasal of a prefix fuses with the initial obstruent of a stem.
   - When a prefix like mang- or pang- attaches to verbs, roots that begin with /p, t, k, b, d, s, / undergo NS. Those with /g, h, tj, dt/ do not.
   - Other morphologically related forms.

2. Masked priming reveals decomposition
   - Priming refers to the facilitation in the identification of an item (the TARGET) due to the prior encounter with a related item (the PRIME).
   - Morphological decomposition refers to processes of breaking down a complex word into its (potential) constituent morphemes.
   - Visual masked priming ([VMP]) is a methodology used to measure the influence of morphological structure in lexical processing.

   ![Figure 1](https://example.com/fig1.png)
   - Map of the Cebuano-speaking regions of the Philippines

3. Porting masked priming to the aural modality

   - **Auditory masked priming (AMP)** was designed to be the auditory analog of VMP.
   - How are primes masked auditorily?
     - Compress primes to ~35% of its original duration
     - Embed it in “noise” (reversed compressed words)
     - Attenuate “noise + prime” sound file to ~15 dB
   - Expose to prime -> Decomposition -> Activated lexical entry of root -> Faster RT

![Figure 3](https://example.com/fig3.png)
- Schematization of X-AMP prior to the prime (bitterness), the target (bitter), and the masked words: cuten, cuten, cuten, and beach.
- Basic finding: morphologically complex words prime their base and other morphologically related forms.

4. Using AMP to investigate lexical access

   **Table 1.** Samples with the target word “bitter” and the four prime-type conditions

<table>
<thead>
<tr>
<th>PRIME TYPE</th>
<th>Prime</th>
<th>Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identity</td>
<td>patid</td>
<td>patid</td>
</tr>
<tr>
<td>No NS</td>
<td>gapatid</td>
<td>patid</td>
</tr>
<tr>
<td>With NS</td>
<td>nanatid</td>
<td>patid</td>
</tr>
<tr>
<td>Unrelated</td>
<td>salum</td>
<td>patid</td>
</tr>
</tbody>
</table>

   **Materials:** 150 verbs with CV.CVC stem
   - 60 real words, distributed across 4 lists via Latin Square
   - 90 fillers (60 nonce words, 30 real words)

   **Procedure:**
   - Experiment deployed in Nexus 10 tablets over headphones using Open Sesame.
   - Participants performed a lexical decision task on the target.
   - After completion, they answered debriefing questions.

   ![Figure 4](https://example.com/fig4.png)
   - Screen participants saw when performing a lexical decision task

5. RESULTS: Morphological priming obtains...

   - Prime awareness from debriefing questions
     - Noise as ambient noise/distraction to make task more difficult
   - No reports of hearing words embedded in noise => subliminal presentation
   - Sensitivity measures: participants were able to discriminate between real and nonce words, with a yes-bias (d’ = 1.81, c = -60)
   - Proportion of hits = 93
   - Proportion of false alarms = 38
   - Priming scores measure the degree of facilitation in lexical access.

   ![Figure 5](https://example.com/fig5.png)
- Priming scores (mean of differences)
  - Unrelated vs. NS (15 dB) = 30, S.D.unrelated = 8
  - Unrelated vs. NS (10 dB) = 30, S.D.unrelated = 8

CONCLUDING REMARKS

SUMMARY OF RESULTS AND IMPLICATIONS

- **Identity-** and No NS-primes facilitated access, consistent with [13,14]
  - Methodological: AMP is a viable methodology for investigating lexical processing in unwritten languages, child languages, and more.
  - Empirico-theoretical: This is in line with theories of lexical processing that take decomposition as a component of lexical access. [3,16,17,18]
  - There was no evidence that With NS-primes did.
  - Empirico-theoretical: This finding presents a challenge for theories that incorporate decomposition in lexical access.
  - This finding suggests that decomposition may be modulated by stem-transparency.

OUTSTANDING QUESTIONS

Why did effects traditionally attributed to decomposition not obtain in the study?

- Distribution of NS-trigger:
  - There are only two prefixes that trigger NS in DB: man-/ and pan-/.

- Processors exploit statistical contingencies in the input to process language. [19]

- Informativity of surface nasals
  - I-to-many mappings between surface nasal and underlying obstruction
  - Low perceptibility of place contrasts in nasals. [20,21]

- Amenable to [22]: the Visual World Paradigm, initial phonological overlap generates greater competition effects than final overlap during lexical access.

- Undoing phonology simply takes time