**A Cross-Language Comparison of the Use of Stress in Word Segmentation**

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**Background**

Word boundaries in continuous speech are hardly acoustically marked. However, listeners use language-specific cues (e.g., lexical stress placement) to segment speech into words (for an overview, see Cutler, 2001).

How are listeners influenced by this native-language segmentation experience when confronted with an unknown foreign language? French has final accent, and French listeners benefit from vowel lengthening and/or a pitch change on the final syllable of each word in an artificial language (Bagou et al., 2002). Dutch has mainly initial stress, and Dutch listeners benefit from a pitch rise on the first syllable of each word in an artificial language (Vroomen et al., 1998).

**The Current Study**

An artificial language of 9 randomly concatenated words was presented to French and Dutch adult listeners in 3 versions: with no stress vs. those with initial- or final-syllable stress (pitch excursion) on each word. An additional experiment tested Australian-English adult listeners (whose language, like Dutch, has initial-syllable stress).

**Method**

**French vs. Dutch Experiment**

<table>
<thead>
<tr>
<th>Language</th>
<th>Listeners</th>
</tr>
</thead>
<tbody>
<tr>
<td>French</td>
<td>72 (Dijon, France)</td>
</tr>
<tr>
<td>Dutch</td>
<td>72 (Nijmegen, The Netherlands)</td>
</tr>
</tbody>
</table>

**Australian Experiment**

<table>
<thead>
<tr>
<th>Australian Listeners</th>
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</thead>
<tbody>
<tr>
<td>72 (Sydney, Australia)</td>
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</tbody>
</table>

A pool of 30 dipphone-synthesized (MBROLA) syllables from: 6 consonants (p,b,m,f,s,k) & 5 vowels (/æ,i,o,u/), chosen to be as phonetically similar as possible between French and Dutch, were randomly allocated to words to create 24 unique languages, each of 10 minutes duration.

To test for the influence of phonetic differences, half of the participants heard a language synthesized using male Dutch diphones and half a language using male French diphones.

**3 Between-Subjects Conditions**

<table>
<thead>
<tr>
<th>Conditions</th>
<th>No Stress</th>
<th>Initial Stress</th>
<th>Final Stress</th>
</tr>
</thead>
<tbody>
<tr>
<td>(free syllable)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>(on-syllable)</td>
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</table>

No stress condition: Monotone 120 Hz.

Stress conditions: A parabolic pitch rise-fall from 120 Hz to 170 Hz over the 1st or last syllable of each word (from Thiessen & Saffran, 2003).

Test items: 27 pairs of words and partwords (e.g., last syllable of one word and the first two syllables of another word). Participants were asked to indicate which member of each pair was a word of the language.

**French vs. Dutch Experiment Results and Discussion**

Participants performed the task very well – all mean scores were above chance (50%, many significantly so).

Data were analysed using planned contrasts:

- Stress (initial + final) vs. No Stress
- French listeners, final stress vs. initial stress, regardless of talker accent. Dutch listeners unexpectedly benefited from initial stress, regardless of the talker, and only benefited from initial stress when the talker's accent was Dutch.

**General Discussion**

Monolingual French and Australian listeners learn words more successfully in an artificial language when prosodic word boundary cues match those of their native language.

Multilingual Dutch listeners appear to have expanded their repertoire of segmentation cues when learning French, so were able to vary their strategy to suit.

Therefore, for second-language (L2) learners: Segmentation is easier when L1 and L2 word boundary characteristics are shared.

Initial insensitivity to L2 characteristics that are not present in the L1 can (sometimes) be overcome with L2 experience.

**Acknowledgements**

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**References**


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**Australian Experiment Results**

Stress (initial + final) vs. No Stress:

- French Talker: Stress (initial + final) > No Stress: M = 6.1%, SE = 3.0%, 95%CI: 0.1%-12.1%.
- Dutch Talker: Initial stress > final stress: M = 9.4%, SE = 3.5%, 95%CI: 2.5%-16.1%.

No interactions. Australians benefited from initial stress only, regardless of talker accent.