Lateral phonotactics in Australian languages

Australian languages have uncommonly large lateral inventories, with up to four laterals /l, l, ñ, ʎ/. These laterals are commonly subject to phonotactic restrictions: they rarely appear word-initially, and hardly ever appear postconsonantally (as in (1), from Hamilton (1996)). There are two common frameworks used to analyze such restrictions. Smith (2002), Gouskova (2003), and others use positional sonority restrictions to describe phonotactic patterns, while Steriade (1997, 1999) and others use Licensing by Cue (LBC) to account for such patterns via the interactions of segmental and contextual acoustics. This paper presents evidence in favor of a sonority-based analysis of these data; I further present acoustic evidence which argues against a LBC analysis, and which raises questions about the predictive power of LBC.

The sonority-based analysis presented here follows Smith (2002) in using her *[ONS/X]/σ₁ hierarchy (in (2)) to ban word-initial laterals by ranking *[ONS/Lateral]/σ₁ above IDENT[F], as in (3). This ranking captures the fact that a lack of word-intial laterals implies a lack of initial rhotics, but not vice versa, as shown in (4). The lack of postconsonantal laterals must be a syllable-contact effect, as languages like Gooniyandi (McGregor 1990) ban heterosyllabic -C.L- sequences while allowing word-initial #CL- complex onsets. These restrictions are expressed using Gouskova’s (2003) *DISTANCE hierarchy (in (5)). In languages like Panyjima, the lack of postconsonantal laterals follows from the general fact that only clusters whose sonority contours are -5 or steeper (using the sonority values in (6)) may surface; this is expressed by the ranking *DIST -4 » IDENT[F] » *DIST -5. This ranking rules out all lateral-final clusters, as laterals are too sonorous for such a cluster to ever satisfy *DIST -5, as shown in (7).

These fixed rankings predict that while general phonotactic patterns follow from the ranking of a general faithfulness constraint (e.g. IDENT[F]) within the hierarchy, higher-ranked specific faithfulness constraints may allow exceptions. One such common exception in Australian languages is initial glides, which are allowed by high-ranked IDENT[V-Place]. Given IDENT[V-Place] » IDENT[F], it is unsurprising that glides may also commonly be exceptions to syllable-contact restrictions, surfacing in a small set of relatively unmarked sonority contexts (e.g. l.w; *n.w, *t.w). Positional sonority hierarchies thus explain lateral phonotactics in terms of broad sonority effects, while allowing particular exceptions.

The second part of this paper reports acoustic studies of Australian laterals. The implicational distribution of laterals is identical to that of e.g. retroflexion, which is commonly explained in terms of LBC (Steriade 1997, 1999). A LBC analysis of laterals would depend on acoustic left-anchoring of laterals parallel to the left-anchoring of e.g. retroflexion.¹ This study looked for coarticulatory left-anchoring at the midpoints of flanking vowels and in the vocalic portions of vowel-lateral transitions.² LBC predicts that preceding vowels should show more coarticulation than following vowels on one or both of these measures, but neither prediction was supported by the data. Following vowels are generally more coarticulated with laterals at their midpoints than are preceding vowels, as in (8). Preceding vowels also failed to show acoustic characteristics of laterals immediately before lateral onsets. This lack of acoustic left-anchoring supports the claim that lateral phonotactics must be explained in terms of sonority.

The coarticulation present in following vowels predicts that laterals should preferentially surface with vowels (or word edges) at their right edges. The presence of sharp amplitude increases in vowels immediately following lateral releases, as in (9), makes the same prediction, as Stevens and Blumstein (1978 et seq.) claim that such increases facilitate segment identification, but phonotactic “right-anchoring” of laterals is unattested in Australian languages. The inability of LBC to make accurate acoustically-based predictions about lateral phonotactics casts doubt on the explanatory role of LBC in phonological theory.

¹ LBC analyses generally discuss neutralization, e.g. of the retroflexion contrast; while many languages allow only one initial apical (with intermediate apical articulation (Butcher 1995)), others allow none at all. This lack of initial apicals must result from a high-ranking constraint against pronouncing necessarily neutralized apicals. A LBC analysis of missing initial laterals would use similar constraints against obligatory neutralization.
² Spectral amplitude changes were measured here following a suggestion in Stevens (1998), as formant frequency showed no appreciable asymmetry.
(1) **Panyjima**  
Postvocalic: ]1[ [ Postconsonantal: *j*]*l*[ *k*]  
Word-initial: *j*]*l*[ *k*]  
**Anindilyakwa**  
Postvocalic: ]1[ [ Postconsonantal: *j*]*l*[ *k*]  
Word-initial: *j*]*l*[ *k*]

(2) **[ONS/X]/σ₁**  
The leftmost premoraic segment in a word must have sonority less than that of X.  
**[ONS/Glide]/σ₁** > **[ONS/Rhotic]/σ₁** > **[ONS/Lateral]/σ₁** > **[ONS/Nasal]/σ₁** > **[ONS/Stop]/σ₁**

(3) **[ONS/Lateral]/σ₁ → IDENT[F]** bans word-initial laterals

<table>
<thead>
<tr>
<th>/lana/</th>
<th>[ONS/Lateral]/σ₁</th>
<th>IDENT[F]</th>
</tr>
</thead>
<tbody>
<tr>
<td>--&gt; tana</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>lana</td>
<td>*</td>
<td>!</td>
</tr>
</tbody>
</table>

(4) *#L → *#R: Panyjima  
Word-initial: *r* *r* *l* *l* *k*  
*#R ≠ *#L: Mbabaram  
Word-initial: *r* *l*  
(Hamilton 1996)

(5) **DISTANCE X**  
The sonority difference between consonants in a heterosyllabic cluster may not be X.  
… *DIST +4 » *DIST +3 » *DIST +2 » *DIST +1 » *DIST 0 » *DIST -1 » *DIST -2 » *DIST -3 » *DIST -4 …

← steep rise ———— flat ———— steep fall →

(6) Sonority values, for segments found in Australian languages (Parker 2002)

<table>
<thead>
<tr>
<th></th>
<th>Glides</th>
<th>Laterals</th>
<th>Nasals</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>11</td>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td>r</td>
<td>10</td>
<td>8</td>
<td>1</td>
</tr>
</tbody>
</table>

(7) **Sonority contours of lateral-final clusters; all are ruled out by *DIST -4 » IDENT[F] » *DIST -5**

<table>
<thead>
<tr>
<th>Glide-L</th>
<th>-2</th>
<th>L-L</th>
<th>0</th>
<th>Nasal-L</th>
<th>+3</th>
</tr>
</thead>
<tbody>
<tr>
<td>r-L</td>
<td>-1</td>
<td>r-L</td>
<td>+1</td>
<td>Stop-L</td>
<td>+8</td>
</tr>
</tbody>
</table>

(8) Flanking vowel coarticulation with laterals; low values indicate a high degree of coarticulation.

(9) Major post-lateral amplitude increase (midvowel amplitude = 0 dB)

**References**


