

Chapter 4

Typological Predictions Beyond Iberian Romance

Among those languages exhibiting a phonological contrast between the coronal tap and trill, the Iberian Romance family has arguably received the most descriptive and theoretical attention since the advent of generative phonology. However, Catalan, European Portuguese, and Spanish constitute only a subset of languages relevant to the construction of an adequate theory of the typological behavior of these rhotics.

This chapter has two main goals, one empirical and one theoretical. First, it will be shown that those Iberian Romance varieties with alveolar trills constitute one of three major typological patterns with respect to contrast preservation. The survey of other languages carried out in this chapter yields a complete typology comprising ten languages, as shown in *Table 4-1*:

Table 4-1: Typological survey of languages with a contrast between coronal tap and trill

Typological Patterns	Languages
Pattern I: Contrast intervocalically	Basque (Basque) Catalan (Iberian Romance) European Portuguese (Non-standard dialects with alveolar trill; Iberian Romance) Sebei (Nilotic) Spanish (Standard dialects with alveolar trill; Iberian Romance)
Pattern II: Contrast intervocalically and word-initially	Kaliai-Kove (Austronesian: Western Oceanic) Palauan (Austronesian: Malayo-Polynesian)
Pattern III: Contrast intervocalically, word-initially, and in heterorganic clusters and word-finally	Kairiru (Austronesian: Western Oceanic) Kurdish (Indo-Iranian) ⁶³ Ngizim (West Chadic)

Table 4-2 completes the typological picture by illustrating the realizations of rhotics in environments where contrast is neutralized:

Table 4-2: A typology of word-level rhotic duration contrast and neutralization

	V_V	#_V	Heterorganic Clusters, V_#	Homorganic Clusters
Basque	contrast	trill	trill	—
Iberian Romance	contrast	trill	tap/trill	trill
Sebei	contrast	tap	tap	—
Kaliai-Kove	contrast	contrast	trill	—
Palauan	contrast	contrast	tap	—
Kairiru	contrast	contrast	contrast	trill
Ngizim	contrast	contrast	contrast	trill
Kurdish	contrast	trill	contrast	—

⁶³ In Kurdish, tap and trill are contrastive intervocalically, in heterorganic clusters, and word-finally, but only trill appears word-initially. See below for discussion.

Once Iberian Romance is viewed from a broader cross-linguistic perspective in *Table 4–2*, several typological generalizations emerge regarding positions of contrast and neutralization. First, languages with contrastive tap and trill appear to be situated along a continuum of positional contrast maintenance. There is an implicational relation among contrastive positions, as illustrated by the hierarchy in (4.1):

$$(4.1) \quad \begin{array}{l} \text{Position 1} \\ \text{Intervocalic} \end{array} < \begin{array}{l} \text{Position 2} \\ \text{Word-initial} \end{array} < \begin{array}{l} \text{Position 3} \\ \text{Heterorganic clusters,} \\ \text{Word-final} \end{array}$$

where contrast in Position x entails contrast in Position y iff $y < x$.

If rhotic duration contrast is maintained in a given position within the hierarchy in (4.1), then contrast is also maintained in positions to the left. An obvious exception is Kurdish, in which the tap and trill contrast in Positions 1 and 3 but not in Position 2, where the trill is obligatory. In Section 4.4.3, I argue that this is only an apparent exception and demonstrate how neutralization to trill in word-initial position makes the Kurdish system *harmonically incomplete* in the sense of Prince and Smolensky (1993:185).

Table 4–2 reveals several generalizations with respect to the positional neutralization of contrast, as shown in (4.2):

- (4.2)
- a. Neutralization affects other positions within the word before it affects intervocalic position. Contrast is maintained between vowels in all of the languages surveyed.
 - b. In most of the languages surveyed, word-initial position either maintains contrast or exhibits neutralization to trill.
 - c. Word-initial tap entails taps also in heterorganic clusters and word-finally, as shown in Sebei. In contrast, word-initial trill does not entail obligatory trills in heterorganic clusters nor word-finally. This is demonstrated by Iberian Romance and Kurdish, in which the trill surfaces word-initially, while both the tap and trill surface in heterorganic clusters and word-finally—non-contrastively in Iberian Romance versus contrastively Kurdish.
 - d. Neutralization treats word-final position and heterorganic clusters as a natural class. No language neutralizes contrast in heterorganic clusters without also neutralizing it in word-final position, and vice-versa.
 - e. Rhotics do not cluster with homorganic consonants in six of the languages surveyed. In the remaining languages, the trill is obligatory under several types of coronal-adjacent configurations. Contrast is never allowed in homorganic clusters in any of the languages surveyed.

The theoretical goal of this chapter is to demonstrate how these generalizations are accounted for by the phonetically-based OT analysis developed in Chapter 3. In the following section, I show how each of the above generalizations follows as a consequence of constraint interaction.

4.1 Typology of Constraint Rankings

One of the central claims of OT is that variation across languages follows from constraint ranking. Specifically, a typology of predicted grammars constitutes the set of distinct grammars predicted by different rankings of the same set of constraints. I argue that typological patterns shown in *Table 4–2* reflect different possible grammars, as predicted

by the rankings of three basic constraint types: the *FAST family, which favors the trill, *HOLD, which favors the tap, and the CONTRAST(duration) hierarchy, which prefers that the two rhotics be phonologically contrastive.

The first generalization in (4.2) is that all of the surveyed languages minimally exhibit intervocalic contrast. This stems from the dominance of CONTRAST(dur/V_V) over the markedness constraints with which it interacts, namely *FAST and *HOLD, as shown in (4.3):

(4.3) Constraint ranking affecting intervocalic position

CONTRAST(dur/V_V)	<i>Intervocalic contrast:</i>
	<i>in all languages surveyed</i>
*FAST,	
*HOLD	

While the lower-ranked constraints of the CONTRAST(duration) hierarchy may be dominated by relevant markedness constraints, the highest-ranked CONTRAST(dur/V_V) is always undominated in languages that have a contrast between the tap and trill. Otherwise, there would be absolute neutralization of the contrast, and the surface realization of rhotics would be determined solely by markedness constraints.

Second, word-initial position typically either maintains contrast or exhibits neutralization to trill. This follows from the high ranking of CONTRAST(dur/#_V) in the former case and of *FAST/INITIAL in the latter, as shown in (4.4):

(4.4) Constraint rankings affecting word-initial position

- | | | |
|----|---|---|
| a. | CONTRAST(dur/#_V)

*FAST/INITIAL,
*HOLD | <i>Word-initial contrast:</i>
<i>Kaliai-Kove, Palauan, Kairiru, Ngizim</i> |
| b. | *FAST/INITIAL

CONTRAST(dur/#_V),
*HOLD | <i>Word-initial trill:</i>
<i>Basque, Iberian Romance, Kurdish</i> |

Now, when *HOLD outranks CONTRAST(dur/#_V), it also outranks—by transitivity of constraint ranking—the context-free CONTRAST(dur). This transitivity relation is a consequence of the universal CONTRAST(duration) hierarchy, in which CONTRAST(dur/#_V) dominates CONTRAST(dur).⁶⁴ If *HOLD dominates the former constraint, then it necessarily also dominates the latter, as shown in (4.5):

(4.5) Constraint ranking affecting non-intervocalic positions

- | | | |
|--------------------|--|------------------------------|
| *HOLD | | <i>Non-intervocalic tap:</i> |
| CONTRAST(dur/#_V), | | <i>Sebei</i> |
| *FAST/INITIAL | | |
| CONTRAST(dur), | | |
| *FAST | | |

Although the positional *FAST/INITIAL is shown to dominate the context-free *FAST in (4.5), their ranking is actually irrelevant. As long as *HOLD is dominant in the hierarchy, the effects of these two lower-ranked *FAST constraints will not be seen. That is to say,

⁶⁴ See Section 3.2.1 of Chapter 3 for motivation of the universal ranking of CONTRAST(duration) constraints in terms of harmonic alignment.

the rankings of *HOLD » *FAST/INITIAL » *FAST and *HOLD » *FAST » *FAST/INITIAL are non-distinct in that both yield the same result, namely tap in word-initial position, in heterorganic clusters, and in word-final position.

The ranking in (4.5) captures the third generalization regarding neutralization, namely that word-initial tap entails taps also in heterorganic clusters and word-finally. More specifically, this generalization follows from the fact that *HOLD is the only constraint that could be responsible for word-initial neutralization to tap because there is no constraint such as *HOLD/INITIAL. In contrast, word-initial trill does not entail obligatory trills in heterorganic clusters nor word-finally. In the ranking in (4.4b), the positional constraint *FAST/INITIAL ensures word-initial trills, but nothing prevents lower-ranked *FAST from interacting with the other context-free constraints *HOLD and CONTRAST(duration), thereby generating different patterns in heterorganic clusters and word-finally.

Fourth, neutralization treats word-final position and heterorganic clusters as a natural class in that absence of contrast in the former entails absence of contrast in the latter, and vice-versa. This is exactly because there is no constraint that distinguishes between word-final position and heterorganic clusters. Since neutralization in one of these contexts is due to the context-free markedness constraints *HOLD and *FAST, the other context is automatically implicated because there is no contrast constraint specific to either of the two contexts. Three scenarios are possible for these positions, as determined by the rankings of the context-free constraints in (4.6):

(4.6) Constraint rankings affecting heterorganic clusters and word-final position

- | | | |
|----|---------------------------------------|---|
| a. | CONTRAST(dur)

*HOLD,
*FAST | <i>Contrast:</i>
<i>Kairiru, Kurdish, Ngizim</i> |
| b. | *HOLD

CONTRAST(dur),
*FAST | <i>Neutralization to tap:</i>
<i>Iberian Romance, Sebei, Palauan</i> |
| c. | *FAST

CONTRAST(dur),
*HOLD | <i>Neutralization to trill:</i>
<i>Basque, Kaliai-Kove</i> |

In Chapter 3, it was argued that the ranking in (4.6b) characterizes those dialects of European Portuguese with alveolar trills, in which only the tap appears in heterorganic clusters and word-finally. On the other hand, the realization of Spanish and Catalan rhotics varies between the tap and trill in these contexts, which suggests that *HOLD and *FAST are unranked with respect to each other but that they both dominate CONTRAST(duration). (See Section 3.3.3 of Chapter 3 for the specifics of the analysis.)

The final generalization is that contrast is never allowed in homorganic clusters, where neutralization to trill is obligatory. This follows from the ranking of *FAST/SAME SITE above the other context-free constraints, shown in (4.7):

- | | | |
|---------|---|--|
| (4.7) | *FAST/SAME SITE

CONTRAST(dur),
*HOLD | <i>Trill in Place-sharing clusters:</i>
<i>Iberian Romance, Kairiru, Ngizim</i> |
|---------|---|--|

This ranking is assumed to hold for all the languages of the rhotic duration typology, although its effects are not visible in languages where rhotics do not surface in Place-

sharing clusters. In fact, there are six languages in *Table 4–2* in which the *FAST/SAME SITE constraint ensures the trill under Place-sharing. With respect to Iberian Romance (i.e., Catalan, European Portuguese, and Spanish), it was argued in Section 3.3.3 of Chapter 3 that the trill is obligatory after alveolar consonants due to Place/stricture-sharing, whereas the tap is possible preconsonantly because rhotic + consonant clusters do not share Place. In Section 4.4.1 below, we will see that Kairiru resembles Iberian Romance with respect to neutralization to trill after alveolar consonants. In Section 4.4.2, preconsonantal rhotics in Ngizim are argued to share Place with a following alveolar noncontinuant, but not with other consonants. In all of these cases, *FAST/SAME SITE guarantees neutralization to trill in Place/stricture-sharing configurations.

In the remaining sections of this chapter, I illustrate the constraint rankings in (4.3) through (4.7) on a language-by-language basis. After an initial review of the analysis proposed in Chapter 3 for Iberian Romance, subsequent sections demonstrate how different rankings predict the remaining typological patterns shown in *Table 4–2*.

4.2 Pattern I: Intervocalic Contrast

Table 4–3 below summarizes the word-level rhotic pattern in Spanish, with examples from the data presented in Chapter 2:

Table 4–3: Word-level distribution of rhotics in Spanish⁶⁵

Position	Realization	Examples
Intervocalic	contrast	<i>pe[r]o</i> 'but' <i>pe[r]o</i> 'dog'
After homorganic consonant	trill	<i>hon[r]a</i> 'honor' <i>al[r]ededor</i> 'around' <i>Is[r]ael</i> 'Israel'
Word-initial		<i>[r]osa</i> 'Rose'
After heterorganic consonant	tap (trill only in highly emphatic speech)	<i>t[r]es</i> 'three' <i>b[r]azo</i> 'arm' <i>c[r]ea</i> 's/he creates'
Before any consonant	stylistically-controlled variation	<i>ma[r ~ r]tes</i> 'Tuesday' <i>ma[r ~ r] verde</i> 'green sea'
Word-final		<i>ma[r ~ r]</i> 'sea'

The Catalan tap and trill were shown to exhibit a pattern similar to that of Spanish.

However, for those European Portuguese varieties with alveolar trills, only the tap surfaces after heterorganic consonants, before any consonant, and word-finally. In

Section 3.3 of Chapter 3, the rankings in (4.8) were shown to account for these patterns:

⁶⁵ This summary does not show the phonological behavior of rhotics at the phrasal level, and the examples are assumed to represent words in isolation. Although the phrasal phonology of tap and trill has been thoroughly investigated in studies focusing on Iberian Romance languages, the data sources for other languages typically fail to discuss phrase-medial contexts such as word-initial postvocalic or word-final prevocalic. Therefore, the empirical survey of this chapter focuses on rhotic patterns only at the word level.

(4.8) Basic constraint rankings for word-level patterns observed in Iberian Romance varieties with alveolar trill

a. Spanish and Catalan

CONTRAST(dur/V_V),
 *FAST/INITIAL
 |
 CONTRAST(dur#_V),
 *FAST/SAME
 |
 *HOLD,
 *FAST
 |
 CONTRAST(dur)

b. European Portuguese

CONTRAST(dur/V_V),
 *FAST/INITIAL
 |
 CONTRAST(dur#_V),
 *FAST/SAME
 |
 *HOLD
 |
 *FAST,
 CONTRAST(dur)

There are at least two documented languages outside of the Iberian Romance family in which the coronal tap and trill are in contrast only intervocally within the word. The following sections present analyses of data from Basque and Sebei, which differ from Iberian Romance with respect to patterns of neutralization. We will see that these differences are exactly what we should expect under different rankings of the same constraints that account for Spanish, Catalan, and European Portuguese.

4.2.1 Basque

Basque is spoken in an area located on both the French and Spanish sides of the western Pyrenees. As demonstrated by the examples in *Table 4–4*, the alveolar tap and trill contrast intervocally in this language, while only the trill occurs elsewhere. (N.B.: The examples are representative rather than exhaustive. Data sources are abbreviated, and specific page numbers of the works are indicated.)

Table 4–4: Rhotic distribution in Basque (Hualde [H] 1991; Saltarelli [S] 1988)

Position	Realization	Examples	Sources
Intervocalic	contrast	<i>e[r]e</i> 'also' <i>e[r]e</i> 'to burn'	H91: p. 11
Word-initial	trill	<i>[r]adar</i> 'radar' <i>[r]azionalizazio</i> 'rationalization'	S88: p. 276
After consonant		<i>[pr]antziar</i> 'French' <i>an[ɖr]e</i> 'woman'	H91: p. 11
Before consonant		<i>a[r̥]o</i> 'corn' <i>no[rk]</i> 'who–ERG'	H91: pp. 11, 14
Word-final		<i>enbo[r]</i> 'trunk'	H91: p. 13

4.2.1.1 Observations

Like Iberian Romance, Basque permits the tap and trill to contrast between vowels, but only the trill surfaces in non-intervocalic positions. None of the examples in Hualde (1991) and Saltarelli (1988) show rhotics clustering with homorganic consonants.

In the native Basque lexicon, rhotics do not occur word-initially. Early lexical borrowings of trill-initial words from Spanish and Latin-Romance resulted in the insertion of a prothetic vowel, "a strategy which is indicative of the absence of initial vibrants at the time of contact" (Saltarelli 1988:276). The examples in (4.9) show how the prothetic vowel served to circumvent the prohibition against initial rhotics:

- (4.9) Vowel prothesis in earlier Spanish and Latin-Romance borrowings (Hualde 1986:21, Saltarelli 1988:276)

<u>Basque</u>		<u>Source</u>
<i>e[r]epublika</i>	'republic'	Sp. [r] <i>epublica</i>
<i>e[r]espuesta</i>	'answer'	Sp. [r] <i>espuesta</i>
<i>e[r]espeto</i>	'respect'	Sp. [r] <i>espeto</i>
<i>a[r]atoi</i>	'rat'	Sp. [r] <i>atón</i> 'mouse'
<i>a[r]opa</i>	'clothes'	Sp. [r] <i>opa</i>
<i>a[r]aza</i>	'race'	Sp. [r] <i>aza</i>
<i>a[r]oka</i>	'rock'	Rom. [r] <i>oka</i> –
<i>e[r]ege</i>	'king'	Rom. [r] <i>ege</i> –

More recent borrowings, such as *radar* 'radar' and *razionalizazio* 'rationalization' in *Table 4–4*, do permit word-initial trills, but native speakers recognize them as borrowings. Nonetheless, words such as these suggest that although the former prohibition against word-initial rhotics is no longer as stringent in contemporary Basque, there is still a restriction against word-initial taps, given that *[r]*adar* and *[r]*azionalizazio* are unattested realizations.

Although all word-final rhotics are neutralized to trill at the phonetic surface, Hualde (1991:13) notes that stem-final contrast is possible. The addition of a vowel-initial suffix to a rhotic-final stem has the effect of placing the rhotic in the contrastive intervocalic position, as seen in (4.10):

- (4.10) Stem-final contrast revealed by suffixation in absolutive singular forms (Hualde 1991:13)

	<u>Uninflected</u>	<u>Absolutive singular</u>
/ur/ 'water'	[ur]	[ura]
/ur/ 'hazelnut'	[ur]	[ura]

4.2.1.2 Analysis

Like Iberian Romance varieties, Basque combines the rankings in (4.3) and (4.4b), which ensure intervocalic contrast and word-initial trills, respectively. In contrast, Basque favors the trill in heterorganic clusters and word-finally by ranking *FAST above CONTRAST(dur) and *HOLD, as in (4.6c). The complete ranking is shown in (4.11):

(4.11) Constraint ranking for Basque

$$\begin{array}{c}
 \text{CONTRAST(dur/V_V),} \\
 \text{*FAST/INITIAL,} \\
 \text{*FAST/SAME} \\
 | \\
 \text{CONTRAST(dur\#_V),} \\
 \text{*FAST} \\
 | \\
 \text{CONTRAST(dur),} \\
 \text{*HOLD}
 \end{array}$$

Tableau (4.12) below illustrates how this ranking generates the Basque pattern. Since there are no examples in Hualde (1991) and Saltarelli (1988) to suggest that rhotics cluster with homorganic consonants, the *FAST/SAME SITE constraint does not have any visible effects and is, therefore, omitted from the tableau.

(4.12) Intervocalic contrast but neutralization to trill elsewhere in Basque

	CONTRAST (dur/V_V)	*FAST/ INITIAL	CONTRAST (dur/#_V)	*FAST	CONTRAST (dur)	*HOLD
☞ a. VrV ≠ VrV				*		**
b. VrV	*!			*	*	
c. VrV	*!				*	**
d. # ^v rV ≠ #rV		*!		*		**
e. # ^v rV		*!	*	*	*	
☞ f. #rV			*		*	**
g. C ^v rV ≠ CrV				*!		**
h. C ^v rV				*!	*	
☞ i. CrV					*	**
j. Vr ^v C ≠ VrC				*!		*
k. Vr ^v C				*!	*	
☞ l. VrC					*	*
m. Vr ^v # ≠ Vr#				*!		*
n. Vr ^v #				*!	*	
☞ o. Vr#					*	*

In this predicted grammar, intervocalic contrast is preserved in candidate (a), while the contrast is neutralized to trill in all other positions: word-initially (f), in heterorganic clusters (i,l), and word-finally (o).

As evidenced by the forms in (4.10), stem-final contrast is recovered when a vowel suffix is added, but neutralized to trill when the rhotic is word-final. This alternation follows from the proposed constraint hierarchy, as shown in tableau (4.13):

- (4.13) Stem-final contrast revealed by suffixation in absolutive singular forms ([ura] vs. [ura]) but neutralized in uninflected forms ([ur])

	CONTRAST (dur/V_V)	*FAST/ INITIAL	CONTRAST (dur/#_V)	*FAST	CONTRAST (dur)	*HOLD
☞ a. ura ≠ ura				*		**
b. ura	*!			*	*	
c. ura	*!				*	**
d. ur ^u # ≠ ur#				*!		*
e. ur ^u #				*!	*	
☞ f. ur#					*	*

The inflected forms in candidate (a) are phonologically contrastive, as ensured by CONTRAST(dur/V_V). In uninflected forms, however, the stem-final rhotic is also word-final, as seen in candidates (d–f). *FAST guarantees neutralization to trill in this position, which makes the surface forms of these two words homophonous in candidate (f).

4.2.2 Sebei

Sebei is an Eastern Sudanic language of the Nilotic family and is spoken by approximately 40,000 people in Eastern Uganda and Western Kenya. According to O'Brien and Cuypers (1975:8), both the alveolar tap and trill occur contrastively between vowels within the word, while only the tap occurs elsewhere.⁶⁶

⁶⁶ O'Brien and Cuypers refer to the shorter rhotic as an alveolar flap. For consistency, however, I continue to refer to this segment as a tap.

Table 4–5: Rhotic distribution in Sebei (O'Brien and Cuypers 1975)

Position	Realization	Examples	Sources
Intervocalic	contrast	<i>ko[r]om</i> 'hard, tough' <i>ko[r]on</i> 'early in the morning'	p. 125
Word-initial	tap	<i>[r]emput</i> 'lips' <i>[r]uket</i> 'walking stick'	pp. 160, 162
After consonant		<i>tam[pr]et</i> 'a ten-cent piece' <i>kap[t̥r]ok</i> 'rubbish pit' <i>yang[kr]an</i> 'excrete'	pp. 119, 171, 181
Before consonant		<i>ku[rp]atit</i> 'young leopard' <i>a[r̥t̥]am</i> 'forty' <i>ka[rk]eyey</i> 'be the same'	pp. 111, 119, 128
Word-final		<i>kame[r]</i> 'lay hands on' <i>wi[r]</i> 'trunk'	pp. 118, 179

4.2.2.1 Observations

Like Iberian Romance and Basque, Sebei preserves contrast intervocalically. However, Sebei differs from Basque in that only the tap surfaces in non-intervocalic positions. Given that all other coronal consonants in the language are dental, Sebei lacks homorganic clusters involving rhotics (O'Brien and Cuypers 1975:7–8).

4.2.2.2 Analysis

In Sebei, CONTRAST(dur/V_V) ranks higher than the conflicting markedness constraints *HOLD and *FAST, thereby ensuring intervocalic contrast between the tap and trill.

Neutralization to tap in all other positions is guaranteed by the ranking of *HOLD above those constraints relevant to word-initial position, heterorganic clusters, and word-final position. As noted above in the discussion surrounding (4.5), the prediction is that the presence of word-initial tap should also entail the presence of taps in other positions—exactly the pattern observed in *Table 4–5*. The complete ranking for Sebei is shown in (4.14):

(4.14) Constraint ranking for Sebei

$$\begin{array}{c}
 \text{CONTRAST}(\text{dur}/\text{V_V}), \\
 \text{*FAST/SAME} \\
 | \\
 \text{*HOLD} \\
 | \\
 \text{CONTRAST}(\text{dur}\#_V), \\
 \text{*FAST/INITIAL} \\
 | \\
 \text{CONTRAST}(\text{dur}), \\
 \text{*FAST}
 \end{array}$$

Tableau (4.15) shows how the high-ranking *HOLD constraint enforces neutralization to tap in all non-intervocalic positions. Since Sebei lacks homorganic clusters involving rhotics, *FAST/SAME SITE is omitted from the tableau.

(4.15) Intervocalic contrast but neutralization to tap elsewhere in Sebei

	CONTRAST (dur/V_V)	*HOLD	CONTRAST (dur/#_V)	*FAST/ INITIAL	CONTRAST (dur)	*FAST
☞ a. VrV ≠ VrV		**				*
b. VrV	*!				*	*
c. VrV	*!	**			*	
d. # ^v rV ≠ #rV		*!*		*		*
☞ e. # ^v rV			*	*	*	*
f. #rV		*!*	*		*	
g. C ^v rV ≠ CrV		*!*				*
☞ h. C ^v rV					*	*
i. CrV		*!*			*	
j. Vr ^v C ≠ VrC		*!				*
☞ k. Vr ^v C					*	*
l. VrC		*!			*	
m. Vr ^v # ≠ Vr#		*!				*
☞ n. Vr ^v #					*	*
o. Vr#		*!			*	

This ranking of the constraints predicts intervocalic contrast (a) versus neutralization to tap word-initially (e), in heterorganic clusters (h,k), and word-finally (n). As shown in the winning candidates for non-intervocalic positions, the dominant position of *HOLD in the hierarchy makes irrelevant the violations of both the word-initial and the context-free constraints. It is thus impossible for the trill to surface in heterorganic clusters or word-finally if only the tap surfaces word-initially. This type of pattern is, to my knowledge, unattested cross-linguistically.

It is worth reiterating here that other logically possible patterns of positional neutralization to tap are empirically unattested precisely because *HOLD is the only

markedness constraint against the trill. Since there is no *HOLD/INITIAL, the only way to ensure word-initial neutralization to tap is to rank *HOLD above *FAST/INITIAL, *FAST, CONTRAST(dur/#_V), and CONTRAST(dur). The relative ranking of the context-specific and context-free *FAST constraints within this lower-ranked group is irrelevant, since context-free *HOLD is dominant. Moreover, since there is no constraint such as *FAST/DIFFERENT SITE or *FAST/V_#, the already-established ranking of *HOLD » *FAST explains why heterorganic clusters and word-final position, respectively, are never singled out over other positions for neutralization to trill.

4.3 Pattern II: Intervocalic and Word-initial Contrast

The languages examined so far in this survey maintain contrast between the coronal tap and trill only between vowels within the word. The Austronesian languages Kaliai-Kove and Palauan both go one step beyond by allowing the contrast to be preserved in word-initial position as well as intervocalically.⁶⁷

⁶⁷ At least two other languages have been reported to have a tap/trill contrast between vowels and word-initially: Guajiro (Mansen 1967) and Malayalam (Kumari 1973). Subsequent research suggests, however, that in both languages, the relevant contrast is one not of duration but of manner and/or place. Guajiro contrasts a lateral flap with an alveolar trill (Alvarez 1986). In Malayalam, one rhotic is a palatalized dental, while the other is an uvularized alveolar (McAlpin 1998). Therefore, these languages are excluded from the present investigation because duration is not the relevant dimension of contrast.

4.3.1 Kaliai-Kove

Kaliai-Kove is a language of the Western Oceanic branch of the Austronesian family. It is spoken in the west New Britain district of the Territory of Papua and New Guinea.

Data examined in this section are from the Kandoka-Lusi dialect, which is spoken on the North Coast of New Britain Island (Counts 1969). While the tap and trill contrast intervocalically and word-initially, only the trill surfaces in clusters and word-finally.

Table 4–6: Rhotic distribution in Kaliai-Kove (Counts 1969)

Position	Realization	Examples	Sources
Intervocalic	contrast	[t ^h uβura] 'bullroarer; our ancestors'	pp. 45, 46
		[t ^h uβuru] 'place, area, location'	
Word-initial		[raila] 'frigate bird'	pp. 45, 46
		[rai] 'southeast wind'	
After consonant	trill	[yrem] 'somewhat, slightly'	p. 22
		[mokrɯp] 'frog'	
Before consonant			[iyaryare] 'he copulates (durative)'
		[^m barku] 'spirit mask type'	
Word-final		[napar] 'dog's tooth net bag'	p. 48
		[t ^h aβur] 'trumpet'	

4.3.1.1 Observations

The form [iyaryare] 'he copulates (durative)' shown in *Table 4–6* is the result of a

reduplication process. This makes [yrem] 'somewhat, slightly', [mokrɯp] 'frog',

and [^mbarku] 'spirit mask type' the only three attested examples of clusters involving a

trill and an adjacent consonant which are not created by reduplication (see Counts 1969:18–20). Rhotics do not cluster with homorganic consonants in this language.

4.3.1.2 Analysis

The preservation of contrast intervocalically and word-initially in Kaliai-Kove stems from the dominance of $\text{CONTRAST}(\text{dur}/\text{V_V})$ and $\text{CONTRAST}(\text{dur}/\#_V)$. Neutralization to trill in all other positions is ensured by the ranking of $*\text{FAST}$ over $\text{CONTRAST}(\text{dur})$ and $*\text{HOLD}$. The complete ranking for Kaliai-Kove is shown in (4.16):

(4.16) Constraint ranking for Kaliai-Kove

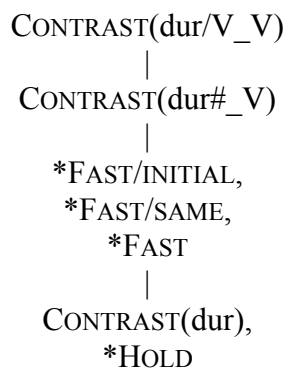


Tableau (4.17) shows how the above constraint ranking makes the correct predictions for different positions within the word. As in the case of Basque and Sebei above, $*\text{FAST}/\text{SAME SITE}$ is omitted from the tableau since Kaliai-Kove lacks homorganic clusters involving rhotics.

(4.17) Intervocalic and word-initial contrast, but neutralization to trill elsewhere in Kaliai-Kove

	CONTRAST (dur/V_V)	CONTRAST (dur/#_V)	*FAST/ INITIAL	*FAST	CONTRAST (dur)	*HOLD
☞ a. VrV ≠ VrV				*		**
b. VrV	*!			*	*	
c. VrV	*!				*	**
☞ d. # ^v rV ≠ #rV			*	*		**
e. # ^v rV		*!	*	*	*	
f. #rV		*!			*	**
g. C ^v rV ≠ CrV				*!		**
h. C ^v rV				*!	*	
☞ i. CrV					*	**
j. Vr ^v C ≠ VrC				*!		*
k. Vr ^v C				*!	*	
☞ l. VrC					*	*
m. Vr ^v # ≠ Vr#				*!		*
n. Vr ^v #				*!	*	
☞ o. Vr#					*	*

In this grammar, contrast is preserved intervocalically (a) and word-initially (d), while contrast is neutralized to trill in heterorganic clusters (i,l), and word-finally (o). Kaliai-Kove resembles Basque with respect to the ranking of *FAST over CONTRAST(dur) and *HOLD. However, Kaliai-Kove differs from Basque in that *FAST/INITIAL is dominated by CONTRAST(dur/#_V).

4.3.2 Palauan

Palauan belongs to the Austronesian language family within the western Malayo-Polynesian branch. In this language, the tap and trill are in contrast intervocalically and word-initially. However, only the tap surfaces in other positions within the word (Hagège 1986; Josephs 1990).

Table 4–7: Rhotic distribution in Palauan (Josephs 1990)

Position	Realization	Examples	Sources
Intervocalic	contrast	<i>me[r]akl</i> 'to pick up out of pot'	pp. 188, 193
		<i>me[r]akl</i> 'to destroy; dismantle'	
Word-initial	contrast	<i>[r]uul</i> 'type of fishnet made of palm leaves'	pp. 295, 296
		<i>[r]uul</i> 'made; done; prepared'	
After consonant	tap	<i>o[mr]alm</i> 'rinse'	pp. 27, 261, 268
		<i>[pr]er</i> 'raft'	
		<i>o[ŋr]aol</i> 'starchy food'	
Before consonant		<i>cha[rm]</i> 'animal; bug; insect'	pp. 35, 39, 83
	<i>do[r̥tʰ]</i> 'ironwood tree'		
	<i>chede[rŋ]or</i> 'type of trepang'		
Word-final	tap	<i>de[r]</i> 'remainder, leftovers'	pp. 76, 124
		<i>klemu[r]</i> 'dried tail of rayfish'	

4.3.2.1 Observations

Palauan resembles Sebei regarding neutralization to tap in non-contrastive positions.

With respect to clusters, Hagège (1986) notes that "la langue tend à éviter les

combinaisons de consonnes homorganiques [The language tends to avoid combinations of homorganic consonants—TGB]" (22). Nonetheless, there are many words in which the tap surfaces before the alveolar fricative [s], some of which are given in (4.18):

(4.18) Tap + alveolar fricative clusters in Palauan (Josephs 1990)

<i>che[rs]uuch</i>	'dolphin fish; mahi-mahi'	(p. 54)
<i>de[rs]tang</i>	'once in a while'	(p. 77)
<i>ke[rs]os</i>	'yearning; anxious'	(p. 114)
<i>se[rs]</i>	'garden; farm; fence'	(p. 305)

In Section 3.3.3 of Chapter 3, it was argued that rhotic + consonant sequences in Iberian Romance are not Place/stricture-sharing clusters. I make the same assumption here, thereby grouping the [rs] clusters of (4.18) with heterorganic ones such as those in *cha[rm]* 'animal; bug; insect', *do[rɰ^h]* 'ironwood tree', and *chede[rɰ]or* 'type of trepang' in *Table 4–7*.

One interesting phonotactic possibility in Palauan is that a sonorant consonant may precede another consonant word-initially, in which case the sonorant is syllabic.

This is illustrated by the data in (4.19):

(4.19) Word-initial sonorant consonants are syllabic before other consonants in Palauan (Josephs 1990 [J]; Hagège 1986 [H])

<i>mchiielak</i>	[mʔiyəlak ^h]	'wait for me!'	(J: p. xl)
<i>nglim</i>	[ŋlim]	'drunk (up)'	(J: p. xl)
<i>ltel</i>	[ltel]	'his return'	(J: p. xl)
<i>rsechek</i>	[rsəʔɛk ^h]	'my blood'	(J: p. xl)
<i>rtangel</i>	[rɰaŋəl]	'is to be pounded'	(J: p. xl)
<i>rsmem</i>	[rsmem]	'your needle'	(H: p. 23)

According to Josephs (1990:xl), syllabic word-initial rhotics, such as those of the last three examples in (4.19), may be pronounced as trills by some speakers. Therefore, I assume that the tap and trill are in free variation word-initially before a consonant. This contrasts with word-initial prevocalic position, in which the tap and trill occur contrastively, as shown by examples such as [r]uul 'type of fishnet made of palm leaves' versus [r]uul 'made; done; prepared' in *Table 4-7*.

4.3.2.2 Analysis

The constraints ensuring intervocalic and word-initial contrast are dominant in Palauan, just like they are in Kaliai-Kove. *HOLD outranks CONTRAST(dur) and *FAST, thereby guaranteeing neutralization to tap in other positions, as in Sebei. The complete ranking for Palauan is shown in (4.20), and the evaluation is shown in tableau (4.21) below:

(4.20) Constraint ranking for Palauan

CONTRAST(dur/V_V)
 |
 CONTRAST(dur#_V)
 |
 *FAST/SAME,
 *FAST/INITIAL,
 *HOLD
 |
 CONTRAST(dur),
 *FAST

(4.21) Intervocalic and word-initial contrast, but neutralization to tap elsewhere in Palauan

	CONTRAST (dur/V_V)	CONTRAST (dur/#_V)	*FAST/ INITIAL	*HOLD	CONTRAST (dur)	*FAST
☞ a. VrV ≠ VrV				**		*
b. VrV	*!				*	*
c. VrV	*!			**	*	
☞ d. # ^v rV ≠ #rV			*	**		*
e. # ^v rV		*!	*		*	*
f. #rV		*!		**	*	
g. C ^v rV ≠ CrV				*!*		*
☞ h. C ^v rV					*	*
i. CrV				*!*	*	
j. Vr ^v C ≠ VrC				*!		*
☞ k. Vr ^v C					*	*
l. VrC				*!	*	
m. Vr ^v # ≠ Vr#				*!		*
☞ n. Vr ^v #					*	*
o. Vr#				*!	*	

This above ranking predicts contrast intervocalically (a) and word-initially before vowel (b), while the tap is predicted to surface in heterorganic clusters (h,k) and word-finally (n).

The same ranking of constraints adequately captures the behavior of word-initial preconsonantal rhotics, whose realization varies freely between the tap and trill (see the data in (4.19) and the surrounding discussion). Tableau (4.22) shows how contrast is allowed word-initially before vowels, while free variation occurs word-initially before consonants:

(4.22) Contrast word-initially before vowel ([r]uul vs. [r]uul), but free variation word-initially before consonant ([$r \sim r$]sm-em)

	CONTRAST (dur/#_V)	*FAST/ INITIAL	*HOLD	CONTRAST (dur)	*FAST
☞ a. [$^u r$]uul ≠ [r]uul		*	**		*
b. [$^u r$]uul	*!	*		*	*
c. [r]uul	*!		**	*	
d. [$^{\text{a}} r^{\text{a}} s$]mem ≠ [$r s$]mem		*	*!		*
☞ e. [$^{\text{a}} r^{\text{a}} s$]mem		*		*	*
☞ f. [$r s$]mem			*	*	

CONTRAST(dur/#_V) preserves contrast in candidate (a) because the word-initial rhotics are prevocalic. This constraint does not apply to candidates (d–f) because the rhotics are preconsonantal in each case. The decision is passed to the lower-ranked *FAST/INITIAL and *HOLD constraints. Since these two constraints are unranked with respect to each other, they collectively rule out the contrastive candidate (d), but fail to distinguish between (e) and (f). As a result, the tap and trill are predicted to vary freely in word-initial preconsonantal position.⁶⁸

⁶⁸ Eric Bakovic (personal communication) suggests a possible alternative analysis in which the constraints at hand simply predict neutralization to tap, due to the ranking of *HOLD » *FAST/INITIAL, while a trilled pronunciation is possible because of the inherent duration of syllabic consonants.

4.4 Pattern III: Contrast Intervocally, Word-initially, and Elsewhere

The final group of languages examined in this survey includes Kairiru, Kurdish, and Ngizim. Each of these languages allows the tap and trill to contrast across-the-board, including in heterorganic clusters and word-finally—except for Kurdish, in which the trill is obligatory word-initially.

4.4.1 Kairiru

Kairiru belongs to the Sepik-Madang subfamily of the Western Oceanic branch of Austronesian languages and is spoken in the East Sepik Province in Papua New Guinea. According to Wivell (1981), Kairiru exhibits a contrast between an alveolar tap and trill, with the tap in free variation with a central approximant [ɹ].⁶⁹ For reasons of simplicity, only the tap is shown in the examples below.

⁶⁹ Wivell (1981:19) states that alveolar tap is in free variation with a "retroflex 'r'" in all positions. I follow Inouye (1995) in interpreting Wivell's use of the term "retroflex" to mean central approximant:

"'Retroflex' is a term used by many non-phoneticians for the central approximant like that in American English regardless of whether the actual articulation is of the bunched tongue or the sublaminal. That fact and the fact that no other manner of articulation is included in this description of this allophone ... lead me to believe that the author is using this traditional terminology" (195).

Table 4–8: Rhotic distribution in Kairiru (Wivell 1981)

Position	Realization	Examples	Sources	
Intervocalic	contrast	[aruŋ] 'he listens, hears' [aruən] 'it is finished'	pp. 25, 26	
Word-initial		[ramatʰ] [rakɛp]	pp. 19	
After heterorganic consonant		[aprimaru] [forpru] [aqrei] [qrap ^h am]	'he persuades them' 'spotted snake eel' 'it is raining' 'your shoulder'	pp. 21, 34
Before consonant		[kurbukʰ] [narbuəpʰ]	'my liver' 'butterfly'	pp. 13, 20
Word-final		[wʊr] [wʊr]	'crayfish' 'banana'	p. 20
After homorganic consonant		trill	[alsru] [sru] [wuntru]	'he chops them down' 'pair, brace' 'I close the door'

4.4.1.1 Observations

The tap and trill are contrastive in all word-level positions in Kairiru except after alveolar consonants, where only the trill occurs, as shown by the last three examples in *Table 4–8* above. Wivell (1981) describes both [s] and [t] as alveolar in place of articulation. Given that not a single example in Wivell's descriptive study shows the tap surfacing after homorganic consonants, Kairiru can be argued to parallel Iberian Romance with respect to obligatory postconsonantal trill. In both languages, alveolar consonant + rhotic clusters

involve Place/stricture-sharing configurations—precisely the context in which

*FAST/SAME SITE favors neutralization to trill.

4.4.1.2 Analysis

Thus far in the typological survey, Kairiru is the first language to show evidence of the ranking in (4.6a), in which context-free CONTRAST(dur) dominates *HOLD and *FAST.

Together with the ranking of CONTRAST(dur/#_V) over *FAST/INITIAL, this ensures that the tap and trill are generally contrastive in all positions within the word. However, since *FAST/SAME SITE still dominates CONTRAST(dur), neutralization to trill is the expected result in Place/stricture-sharing configurations. The complete ranking for Kairiru is shown in (4.23):

(4.23) Constraint ranking for Kairiru

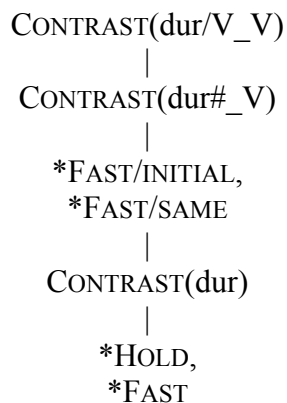


Tableau (4.24) shows how the CONTRAST(dur) constraints preserve across-the-board contrast between the tap and trill:

(4.24) Contrast intervocally, word-initially, and elsewhere in Kairiru

	CONTRAST (dur/V_V)	CONTRAST (dur/#_V)	*FAST/ INITIAL	CONTRAST (dur)	*HOLD	*FAST
☞ a. VrV ≠ VrV					**	*
b. VrV	*!			*		*
c. VrV	*!			*	**	
☞ d. # ^v rV ≠ #rV			*		**	*
e. # ^v rV		*!	*	*		*
f. #rV		*!		*	**	
☞ g. C ^v rV ≠ CrV					**	*
h. C ^v rV				*!		*
i. CrV				*!	**	
☞ j. Vr ^v C ≠ VrC					*	*
k. Vr ^v C				*!		*
l. VrC				*!	*	
☞ m. Vr ^v # ≠ Vr#					*	*
n. Vr ^v #				*!		*
o. Vr#				*!	*	

This ranking accounts for contrast in all positions: intervocally (a), word-initially (d), in heterorganic clusters (g,j), and word-finally (m).

With respect to postconsonantal rhotics, tableau (4.25) shows how contrast is permitted after heterorganic consonants but neutralized to trill in Place/stricture-sharing configurations:

(4.25) Contrast after heterorganic consonants, but neutralization to trill after homorganic consonants in Kairiru

	*FAST/ SAME	CONTRAST (dur)	*HOLD	*FAST
☞ a. $C^v rV \neq CrV$			**	*
b. $C^v rV$		*!		*
c. CrV		*!	**	
d. $\{C^v r\}V \neq \{Cr\}V$	*!		**	*
e. $\{C^v r\}V$	*!	*		*
☞ f. $\{Cr\}V$		*	**	

Since the clusters in candidates (a–c) do not share Place, *FAST/SAME SITE is irrelevant, and CONTRAST(dur) decides in favor of contrast maintenance (a). The presence of the tap in the Place/stricture-sharing clusters (d,e) does violate *FAST/SAME SITE, which chooses candidate (f), with neutralization to trill, as the winner.

4.4.2 Ngizim

Ngizim is a West Chadic language spoken by 25,000 people in northeast Nigeria.

According to Schuh (1981:xi), this language contrasts an alveolar tap and trill in all positions except before coronal stops [t, d, d̥, n] and lateral fricatives [ɬ, ɮ].

Table 4–9: Rhotic distribution in Ngizim (Schuh 1981)

Position	Realization	Examples	Sources
Intervocalic	contrast	<i>saa[r]a</i> 'peer' <i>saa[r]u</i> 'a loan; a thing lent'	p. 144
Word-initial		<i>[r]akau</i> 'chase away' <i>[r]akka</i> 'metal anklet for women'	p. 136
Before heterorganic consonant		<i>ka[rm]u</i> 'cut down' <i>kə[rm]ai</i> 'chieftainship' <i>aatə[rʃ]an</i> 'perfume' <i>pə[rʃ]i</i> 'lip' <i>tə[rk]u</i> 'orphan' <i>tə[rk]akdu</i> 'repeatedly press on'	pp. 13, 88, 94, 131, 153, 154
Before homorganic continuant cons.		<i>wu[rz]u</i> 'back' <i>bə[rz]əngəlu</i> 'large intestine' <i>ku[rs]aasiya</i> 'kidney' <i>bə[rz]anzan</i> 'rolling around on the ground'	pp. 17, 99, 173
Word-final		<i>zəgə[r]</i> 'time' <i>zəga[r]</i> 'north'	p. 180
Before homorganic noncontinuant cons.		trill	<i>sə[rt]u</i> 'string beads' <i>a[rd]aatu</i> 'agree to, approve of' <i>ga[rd]u</i> 'cut notch in' <i>ku[rn]a</i> 'a thorny tree' <i>ga[rɽ]a</i> 'strong in taste, bitter' <i>ngu[rɕ]adliya</i> 'throat'

4.4.2.1 Observations

Schuh (1981:68) lists only one example in which a rhotic surfaces directly after a consonant: *ga[mr]aariyak* 'completely worn out hoe blade'. The lack of consonant + rhotic clusters in Ngizim is most likely due to the fact that CCV syllables are disallowed and that combinatorial possibilities in heterosyllabic sonorant + sonorant sequences are limited especially when nasals are involved (see Schuh 1978:280-283).

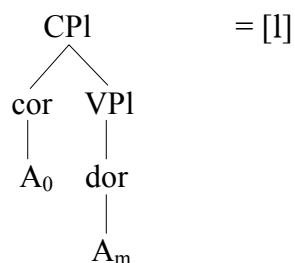
Neutralization to trill in preconsonantal position appears to necessitate reference to two distinct conditioning environments, namely before alveolar noncontinuants (e.g., *sə[rɾ]u* 'string beads', *a[rɾ]aatu* 'agree to, approve of', etc) and before lateral fricatives (e.g., *ga[rɬ]a* 'strong in taste, bitter' and *ngu[rɬ]adliya* 'throat'). However, further consideration of the articulatory properties of lateral fricatives makes it possible to unify these two seemingly disparate segmental contexts. As Ladefoged and Maddieson (1996) argue,

"laterals are segments with two articulations. One governs the location and type of stricture of the central articulation and the other governs the location and size of the lateral aperture. [...] Lateral fricatives ... will normally be produced with a central closure since this will facilitate narrowing of the lateral escape aperture" (214).

If Ngizim lateral fricatives [ɬ] and [ɮ] possess not only a lateral fricative release but also a central closure in the alveolar region, then the common property that they share with alveolar stops [t, d, ɗ, n] is the specification for alveolar closure. In other words, both sets of phones are specified as noncontinuant with respect to alveolar constriction, while the lateral fricatives are additionally specified for lateral fricative release.

Combining the insights of Padgett (1994, 1995) and Walsh (1997), Holt (in press) proposes a representation of liquids involving both primary and secondary Place nodes that dominate different stricture values.⁷⁰ I adapt Holt's geometric representation of liquids as shown in (4.26), with aperture positions substituting for specifications of the feature [cont]. (N.B.: CPI and VPI denote Consonantal Place and Vocalic Place, respectively.)

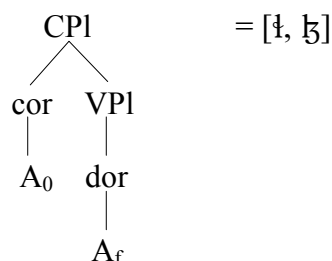
(4.26) Feature-geometric representation of laterals as segments with dual aperture specifications (cf. Holt, in press)



If we assume that lateral fricatives are specified for A_f fricative aperture under the secondary dorsal node, then this representation captures the insight of Ladefoged and Maddieson (1996) regarding the dual articulatory nature of this type of segment:

⁷⁰ See Holt's (2000) review of the longstanding debate regarding the continuancy specification of lateral liquids. In short, some researchers have argued that /l/ is [-cont], while others have made the opposite claim that /l/ is [+cont]. The geometry in (4.26) reflects Holt's proposed solution to the paradox, namely that /l/ is both continuant and noncontinuant, as evidenced by the presence of A_m and A_0 positions, respectively.

(4.27) Proposed aperture-theoretic representation of lateral fricatives⁷¹



The geometry of lateral fricatives shown in (4.27) illustrates the relatedness of these segments to alveolar noncontinuants: both are specified with A_0 closure under the coronal node. The true generalization regarding preconsonantal neutralization, then, is that Ngizim disallows the tap before any segment in which coronal directly dominates an A_0 aperture position, that is, before coronal (alveolar) noncontinuants.

4.4.2.2 Analysis

The constraint ranking required for Ngizim is essentially identical to that proposed for Kairiru in (4.23) above. The evaluation in tableau (4.24) is also equivalent in the case of Ngizim, except for the lack of postconsonantal clusters mentioned above.

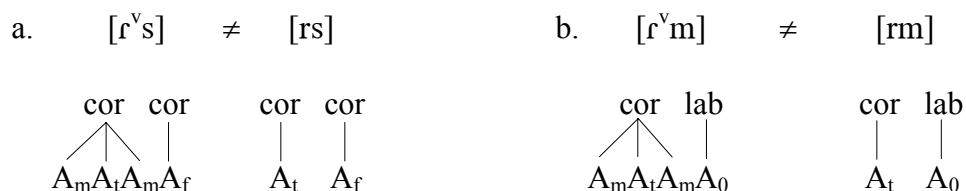
Preconsonantal neutralization in Ngizim deserves further comment. In Section 3.3.3 of Chapter 3, I argued that rhotic + consonant sequences are not Place/stricture-sharing configurations, even when the second consonant is itself alveolar. This explains why the tap can appear before homorganic consonants in Iberian Romance, either

⁷¹ The voicing distinction between lateral fricatives is represented by specifications for the feature [voice], not shown in this representation.

obligatorily as in European Portuguese or in stylistically-controlled variation with the trill as in Catalan and Spanish. The same explanation was proposed for Palauan [rs] clusters, shown in (4.18) above. In all cases, the rhotic and the following consonant each maintain separate Place nodes, thereby rendering *FAST/SAME SITE irrelevant in the evaluation.

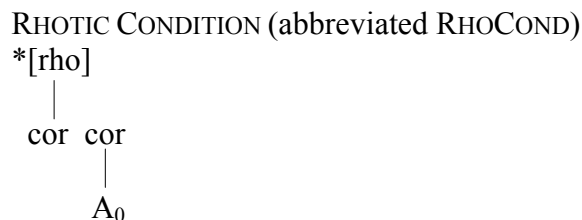
In the case of Ngizim, we see once again that the independence of Place nodes allows the tap to surface before any consonant regardless of its place specification. As shown in (4.28), tap and trill are generally contrastive preconsonantly:

(4.28) Independence of Place allows preconsonantal contrast in Ngizim



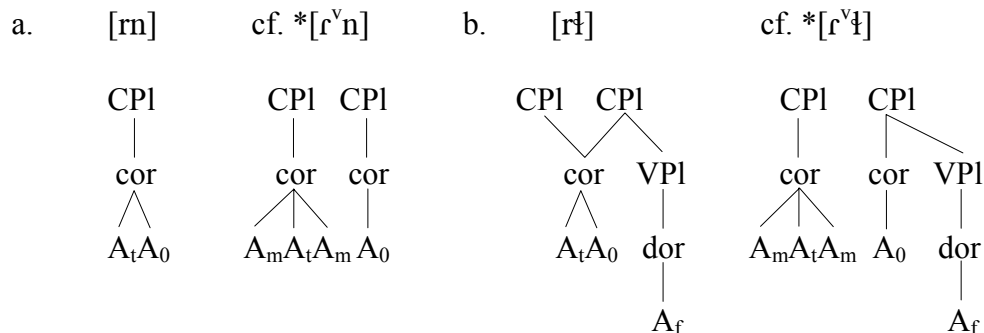
As discussed above, however, the tap is disallowed before coronal noncontinuants. A possible analysis of this restriction is to posit that rhotics share coronal Place with a following consonant if the consonant is specified for [cor, A₀], that is, if the consonant involves complete closure in the alveolar region. A constraint-based formulation of this restriction is given in (4.29):

(4.29) Condition on the independence of coronal Place in rhotic + consonant clusters



The effect of this constraint on the geometry of rhotic + consonant clusters is illustrated in (4.30):

(4.30) Rhotics share coronal Place with following coronal noncontinuants (i.e., alveolar stops and lateral fricatives)



In (4.30a), RHOCOND favors a representation in which the rhotic and the following nasal share coronal Place. With respect to rhotics followed by lateral fricatives in (4.30b), the constraint is satisfied by the sharing of coronal under the CPI node, and the lateral fricative retains its secondary dorsal specification under VPI. In both cases, Place/stricture-sharing allows *FAST/SAME SITE to become active, thereby ensuring neutralization to trill.

Tableau (4.31) shows how RHOCOND and *FAST/SAME SITE work together to yield neutralization to trill before coronal noncontinuants in Ngizim. (N.B.: Recall that Place/stricture-sharing clusters are indicated by the use of { } brackets.)

(4.31) Contrast preserved before coronal fricatives, but neutralization to trill before coronal noncontinuants in Ngizim

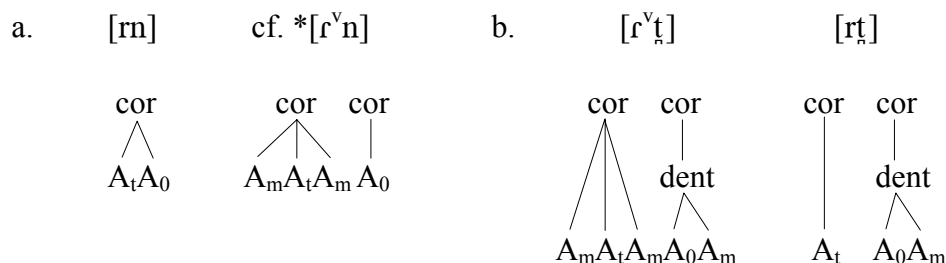
	RHOCOND	*FAST/ SAME	CONTRAST (dur)	*HOLD	*FAST
☞ a. $V_f^v s \neq Vrs$				*	*
b. $V_f^v s$			*!		*
c. Vrs			*!	*	
d. $V_f^v \text{ɬ} \neq Vr\text{ɬ}$	*!*			*	*
e. $V_f^v \text{ɬ}$	*!		*		*
f. $Vr\text{ɬ}$	*!		*	*	
g. $V\{r^v \text{ɬ}\} \neq V\{r\text{ɬ}\}$		*!		*	*
h. $V\{r^v \text{ɬ}\}$		*!	*		*
☞ i. $V\{r\text{ɬ}\}$			*	*	

Since the clusters in candidates (a–c) are not Place-sharing, *FAST/SAME SITE is irrelevant. Therefore, lower-ranked CONTRAST(dur) preserves contrast between the tap and trill before alveolar fricatives. In each of the clusters in candidates (d–i), the rhotic appears before a lateral fricative. RHOCOND rules out candidates (d–f) because the rhotic has an independent Place node before a following coronal noncontinuant (see (4.30b) above). Of the remaining candidates, *FAST/SAME SITE rules out (g) and (h) because the tap appears in a Place/stricture-sharing configuration. The winner is (i) with neutralization to trill before the lateral fricative.

There are further issues to consider with respect to the cross-linguistic implications of positing a constraint such as RHOCOND in order to account for preconsonantal neutralization in Ngizim. Richard Page (personal communication) raises a question regarding the potential effects of RHOCOND in a language like Spanish, namely: Why does this constraint not force a trill realization preconsonantly in a word such as

martes 'Tuesday', in which the rhotic appears before a following coronal stop? The reason it does not is because the post-rhotic consonant in this Spanish example is actually dental: [t̪]. As formulated in (4.29), RHOCOND requires that the consonant be homorganic with the preceding rhotic, i.e., that the overall cluster have an alveolar Place of articulation. On the assumption that dental plosives possess an intermediate [dental] feature between the primary coronal node and the terminal aperture positions, the representations in (4.32) show why RHOCOND is irrelevant in rhotic + dental clusters:

(4.32) RHOCOND forces Place/stricture-sharing before alveolar noncontinuants but not before dental noncontinuants



In (4.32a), RHOCOND is violated by Place independence when the alveolar rhotic appears before the alveolar A₀ nasal and, therefore, prefers that both segments share Place. In (4.32b), RHOCOND is irrelevant because the following consonant is dental, and the prediction is that both the tap and trill should be possible realizations, depending, of course, on the ranking of other constraints such as *FAST, *HOLD, and CONTRAST(dur).

Nevertheless, Spanish does possess consonants that are specified for A₀ alveolar closure after rhotics, namely [n] and [l] (see (4.26) above for the geometric representation of the latter). Left to its own devices, RHOCOND would force a Place/stricture-sharing configuration in these cases, thereby allowing *FAST/SAME SITE to decide in favor of

preconsonantal neutralization to trill. The resulting prediction is that only the trill should be possible in Spanish clusters of the form rhotic + [n] or [ɲ], as is the case in Ngizim, e.g., *ku[rn]a* 'a thorny tree'. The fact remains, however, that in a word such as *carne* 'meat', Spanish exhibits stylistically-controlled variation between the tap and trill: [karne ~ karne] (cf. *Table 4–3*).⁷² Tableau (4.33) illustrates the problem:

(4.33) Obligatory neutralization to trill incorrectly predicted before alveolar nasal in Spanish

	RHOCOND	*FAST/ SAME	*HOLD	*FAST	CONTRAST (dur)
a. $Vr^n \neq Vrn$	*!*		*	*	
b. Vr^n	*!			*	*
c. Vrn	*!		*		*
d. $V\{r^n\} \neq V\{rn\}$		*!	*	*	
e. $V\{r^n\}$		*!		*	*
☛ f. $V\{rn\}$			*		*

RHOCOND rules out candidates (a–c) because the rhotic does not share Place with the following alveolar nasal. Among the remaining Place/stricture-sharing candidates, *FAST/SAME SITE decides in favor of (f), with neutralized trill, in a manner similar to Ngizim (4.31i).

⁷² As John Lipski (personal communication) suggests, however, further detailed empirical investigation may reveal that Ngizim-type realizations are, in fact, attested in one form or another. Along these lines, see Harris' (1985) analysis of Habanero Spanish, in which some liquid + coronal stop clusters are realized as uniform retroflected noncontinuant sequences.

Note that this problem remains unresolved even if RHOCOND is ranked low in the hierarchy, as shown in tableau (4.34):

(4.34) Insufficiency of low-ranking RHOCOND

	*FAST/ SAME	*HOLD	*FAST	CONTRAST (dur)	RHOCOND
a. $Vr^n \neq Vrn$		*	*!		**
b. Vr^n			*	*	*!
c. Vrn		*		*	*!
d. $V\{r^n\} \neq V\{rn\}$	*!	*	*		
e. $V\{r^n\}$	*!		*	*	
☛ f. $V\{rn\}$		*		*	

*FAST/SAME SITE rules out candidates (d) and (e), while lower-ranked *HOLD and *FAST collectively disfavor candidate (a). The remaining candidates (b), (c) and (f) are equally harmonic until lowest-ranked RHOCOND has its say in the evaluation. Specifically, (b) and (c) violate this constraint because the rhotic does not share Place with the following alveolar nasal, just as in tableau (4.33) above for Ngizim. The problem is that RHOCOND, regardless of its ranking with respect to the constraints at hand, will always favor Place/stricture-sharing configurations in rhotic + alveolar nasal clusters, thereby allowing *FAST/SAME SITE to force neutralization to trill.

As established in the discussion thus far, the RHOCOND constraint is clearly violated by certain clusters in languages such as Spanish. Throughout this dissertation, we have made the assumption that rhotic + consonant clusters do not constitute Place/stricture-sharing configurations in order to account for the fact that the tap can

occur before homorganic consonants.⁷³ Such an implicit assumption is insufficient, however, if the problem illustrated by tableaux (4.33) and (4.34) is to be solved in any formal way. Therefore, let us formalize this assumption in terms of the constraint in (4.35):

- (4.35) RHOTIC PLACE (abbreviated as RHOP_L)
 Given a cluster of the form rhotic + consonant, the rhotic maintains Place independently of the following consonant.

This constraint has a plausible phonetic basis in the perceptibility of tap and trill segments. The $A_m A_t A_m$ contour representation (see Section 3.2.2.1 of Chapter 3) provides the tap with a release position, which functions to ensure perceptibility of the tap in preconsonantal position. Similarly, the A_t trill possess an inherently salient acoustic structure, consisting of vocalic formant values briefly interrupted by periods of stop-like silence (see Section 3.1.2.1 of Chapter 3). RHOP_L, then, is grounded in the greater perceptibility of preconsonantal tap and trill vis-à-vis other segment types, as ensured by their articulatory and acoustic properties (cf. unreleased plosives and nasals, which are represented simply as A_0 closure positions).

The ranking of RHOC_{OND} with respect to RHOP_L accounts for the different behavior of preconsonantal rhotics in Spanish and Ngizim. Specifically, the ranking of RHOP_L » RHOC_{OND} dictates that Spanish rhotic + consonant clusters are not Place/stricture-sharing, as shown in tableau (4.36):

⁷³ This assumption was initially stated in Section 3.3.3 of Chapter 3.

(4.36) Stylistically-controlled variation between tap and trill before alveolar nasal in Spanish

	RHOPL	RHOCOND	*FAST/ SAME	*HOLD	*FAST	CONTRAST (dur)
a. $Vr^n \neq Vrn$		**!		*	*	
b. Vr^n		*			*	*
c. Vrn		*		*		*
d. $V\{r^n\} \neq V\{rn\}$	*!*		*	*	*	
e. $V\{r^n\}$	*!		*		*	*
f. $V\{rn\}$	*!			*		*

High-ranking RHOPL rules out Place/stricture-sharing candidates (d–f). The double violation of RHOCOND by the Place-independent candidate (a) eliminates this candidate from the evaluation. The remaining candidates (b) and (c) share the same number of constraint violations and are thus equally harmonic. The result is that both the tap and trill may appear in stylistically-controlled variation before alveolar nasals in Spanish.⁷⁴

The opposite ranking of RHOCOND » RHOPL in Ngizim still guarantees the desired outcome of neutralization to trill, as shown in tableau (4.37):

⁷⁴ The ranking of RHOPL » RHOCOND may be assumed for Catalan and those dialects of European Portuguese with alveolar trills, since the tap surfaces before alveolar A_0 segments in these varieties as well.

(4.37) Neutralization to trill before alveolar nasal in Ngizim

	RHOCOND	RHOPL	*FAST/ SAME	CONTRAST (dur)	*HOLD	*FAST
a. $V_{r^v n} \neq V_{rn}$	*!*				*	*
b. $V_{r^v n}$	*!			*		*
c. V_{rn}	*!			*	*	
d. $V_{\{r^v n\}} \neq V_{\{rn\}}$		**!	*		*	*
e. $V_{\{r^v n\}}$		*	*!	*		*
f. $V_{\{rn\}}$		*		*	*	

Candidates (a–c) are ruled out by high-ranking RHOCOND because the rhotic does not share Place with the following alveolar nasal. Candidate (f) with preconsonantal trill fares better than its competitors (d) and (e) with respect to the lower-ranked constraints RHOPL and *FAST/SAME. As encapsulated by the ranking of RHOCOND » RHOPL, the general independence of preconsonantal rhotic Place in Ngizim is sacrificed in order to satisfy the restriction that a rhotic + alveolar noncontinuant cluster must not maintain distinct Place nodes.

4.4.3 Kurdish

A member of the Indo-Iranian group of the Indo-European language family, Kurdish is spoken in Kurdistan and parts of Iran, Iraq and Turkey. With respect to the distribution of the alveolar tap and trill in Kurdish, Abdulla and McCarus (1967) observe that "only the trill occurs at the beginning of a word... Any place else in the word either variety of *r* may occur" (9). The complete distribution is shown in *Table 4–10*:

Table 4–10: Rhotic distribution in Kurdish (Abdulla and McCarus [AM] 1967; McCarus [M] 1997)

Position	Realization	Examples	Sources
Intervocalic	contrast	[bərə] 'take some!' [bərə] 'release it!'	AM: p. 9
Word-initial	trill	[roʒ] 'sun' [roʒekiwa] 'a day like this'	M: pp. 693, 704
After consonant	contrast	[brin] 'wound' [brin] 'to cut'	AM: p. 9
Before consonant		[xrap] 'bad' [ʔəkre] 'he buys'	AM: p. 10
		[bɪrmə] (a kind of pastry) [pɪrmə] 'fluttering of the lips'	
Word-final		[wɪrg] 'stomach, belly' [wɪrk] 'temper tantrum'	AM: p. 10
	[pɪr] 'old' [pɪr] 'full'		

4.4.3.1 Observations

With respect to intervocalic and word-initial positions, the Kurdish tap and trill pattern in a manner similar to Iberian Romance languages and Basque. These languages allow contrast between vowels word-medially, but the contrast is neutralized to trill word-initially. However, the parallel does not hold in other positions within the word. Kurdish maintains tap/trill contrast not only intervocalically but also in heterorganic clusters and word-finally. Contrast is neutralized in these positions in Iberian Romance and Basque.

Finally, since Abdulla and McCarus (1967) do not explicitly mention homorganic clusters containing a rhotic, I assume such sequences to be unattested.

4.4.3.2 Analysis

The parallel between Iberian Romance, Basque, and Kurdish stems from the fact that in these languages, (1) CONTRAST(dur/V_V) dominates *HOLD and *FAST, ensuring intervocalic contrast, and (2) *FAST/INITIAL dominates CONTRAST(dur/#_V) and *HOLD, ensuring word-initial neutralization to trill. Kurdish differs from the other languages in the ranking of CONTRAST(dur) with respect to *HOLD and *FAST, which ensures contrast maintenance in heterorganic clusters and word-finally. The complete ranking for Kurdish is shown in (4.38), and tableau (4.39) below illustrates the evaluation of candidates:

(4.38) Constraint ranking for Kurdish

CONTRAST(dur/V_V),
 *FAST/INITIAL
 |
 CONTRAST(dur/#_V),
 *FAST/SAME
 |
 CONTRAST(dur)
 |
 *HOLD,
 *FAST

(4.39) Contrast intervocally and elsewhere, except neutralization to trill word-initially in Kurdish

	CONTRAST (dur/V_V)	*FAST/ INITIAL	CONTRAST (dur/#_V)	CONTRAST (dur)	*HOLD	*FAST
☞ a. V _r V ≠ VrV					**	*
b. V _r V	*!			*		*
c. VrV	*!			*	**	
d. # ^v rV ≠ #rV		*!			**	*
e. # ^v rV		*!	*	*		*
☞ f. #rV			*	*	**	
☞ g. C ^v rV ≠ CrV					**	*
h. C ^v rV				*!		*
i. CrV				*!	**	
☞ j. V _r ^v C ≠ VrC					*	*
k. V _r ^v C				*!		*
l. VrC				*!	*	
☞ m. V _r ^v # ≠ Vr#					*	*
n. V _r ^v #				*!		*
o. Vr#				*!	*	

Except for the obligatory word-initial trill shown in candidate (f), Kurdish rhotics are contrastive in all positions: intervocally (a), in heterorganic clusters (g,j), and word-finally (m).

4.4.3.3 Word-initial Neutralization and Harmonic Incompleteness

Of all the languages appearing in the typological survey of this chapter, Kurdish is unique in that it appears to contravene the implicational relation among positions of contrast, which I repeat below from (4.1):

(4.40) Position 1 < Position 2 < Position 3
 Intervocalic Word-initial Heterorganic clusters,
 Word-final

where contrast in Position x entails contrast in Position y iff $y < x$.

If the tap and trill are phonologically contrastive in a given position within the hierarchy in (4.40), then they are also contrastive in all positions to the left. As shown by the data in *Table 4–10*, however, Kurdish allows the contrast intervocalically, in heterorganic clusters, and word-finally, but *neutralizes* the contrast to trill word-initially. According to (4.40), we should expect contrast word-initially as well as intervocalically, since contrast is preserved elsewhere.

According to Prince and Smolensky (1993), "harmonic completeness means that when a language admits forms that are marked along some dimension, it will also admit all the forms that are less marked along that dimension" (185). Under the proposed system, the positional hierarchy in (4.40) is the relevant dimension. The hierarchy is in itself harmonically complete because rhotic duration contrast in more marked positions (e.g., in heterorganic clusters and word-finally) entails contrast in all less marked positions (e.g., word-initially and between vowels). However, the fact that the positional hierarchy is harmonically complete does not mean that harmonically incomplete languages are impossible. A language is harmonically incomplete if it admits a form that is marked along some dimension without admitting less marked structures as well. As Morelli (1999) argues,

"[o]ther factors may, indeed, come into play that give rise to *harmonically incomplete* languages. In this type of language a more marked structure surfaces because of the constraint system, but a less marked structure cannot surface due to some other constraint that interacts with the system

proposed. In particular an *harmonically incomplete* language may result from the interaction of various dimensions of markedness" (53).

In short, we should expect to find instances of harmonic incompleteness with respect to a given markedness dimension since other markedness dimensions may also come into play.

The notion of harmonic incompleteness provides a context within which to view Kurdish word-initial neutralization. Like Kairiru and Ngizim, Kurdish allows rhotic duration contrast in marked positions (i.e., in heterorganic clusters and word-finally) because CONTRAST(dur) dominates *HOLD and *FAST, as shown in (4.38). Recall that *FAST/INITIAL is a separate, positional variant of *FAST which also interacts with the CONTRAST(dur) hierarchy. Since *FAST/INITIAL dominates CONTRAST(dur/#_V), contrast is not possible in the less marked word-initial position. Therefore, Kurdish is harmonically incomplete with respect to the positional hierarchy in (4.40) due to the markedness of word-initial tap, as ensured by *FAST/INITIAL. However, the CONTRAST(dur) constraint hierarchy in itself is harmonically complete and fully capable of accounting for the implicational relation among contrastive positions observed in other languages of the typology.

4.5 Comparison with Syllable-based Alternatives

In Section 2.3 of Chapter 2, it was shown that not all aspects of the typological behavior of the tap and trill can be adequately captured with reference to syllable structure alone. Specific arguments are repeated below for convenience:

1. The surface trill is ambiguous, patterning as a single phonological unit in some languages (e.g., Ngizim, Kaliai-Kove, and Kairiru), and as a cluster in others (e.g., Palauan and Kurdish). It is, therefore, not always feasible to represent the tap/trill contrast in terms of a singleton-geminate pair. However, some account must be given of the fact that the trill can surface as the phonetic reflex of an underlying cluster of taps.
2. In Basque and Kaliai-Kove, neutralized trills behaves in a manner not predicted by sonority principles, surfacing to the exclusion of taps in complex onsets and syllable rhymes.
3. In Kairiru and Ngizim, obligatory neutralization to trill is conditioned not by syllable position but by the Place/stricture-sharing configuration of the cluster.

I postpone discussion of the ambiguous nature of surface trill until Chapter 5, which concludes the dissertation with a focus on representational issues.

The remainder of this chapter focuses on the second and third arguments above. In both cases, I show how the phonetically-based OT analysis illustrated in this chapter effectively avoids the problems facing syllable-based alternatives of the same phenomena.

4.5.1 Sonority and Neutralization to Trill in Basque and Kaliai-Kove

Recall the prediction of sonority-based accounts that if the trill occurs as the second member of a complex onset or in rhyme position, then the tap should also be allowed to occur in these same positions. This is demonstrated by the tableaux in (4.41), where

SONORITY is a constraint which bans the less sonorous trill from complex onsets and rhyme position. (N.B.: Syllable boundaries are represented with [] brackets.)

(4.41) Trill in complex onset and syllable rhyme entails tap in the same positions

	SONORITY	CONTRAST(dur)
a. [CrV ≠ [CrV	*!	
☞ b. [CrV		*
c. [CrV	*!	*
d. Vr] ≠ Vr]	*!	
☞ e. Vr]		*
f. Vr]	*!	*

	CONTRAST(dur)	SONORITY
☞ g. [CrV ≠ [CrV		*
h. [CrV	*!	
i. [CrV	*!	*
☞ j. Vr] ≠ Vr]		*
k. Vr]	*!	
l. Vr]	*!	*

If SONORITY ranks above CONTRAST(dur), then only the tap is allowed, as shown in candidates (b,e). If SONORITY ranks below CONTRAST(dur), then both the trill and tap occur contrastively, as seen in (g,j). No ranking of these two constraints will allow the trill to surface in onset clusters or syllable rhymes without also allowing tap to surface in the same positions.

The prediction of sonority-based accounts is falsified by the behavior of rhotics in Basque and Kaliai-Kove. In both languages, the trill surfaces to the exclusion of the tap in onset clusters and in rhyme position, as shown in (4.42) and (4.43):

(4.42) Basque trill in onset clusters and in rhyme position (see *Table 4–4*)

- | | | |
|----|-------------|-----------|
| a. | [pr]antziar | 'French' |
| | an[ɖr]e | 'woman' |
| b. | a[r.ɾ]o | 'corn' |
| | no[rk] | 'who–ERG' |
| | enbo[r] | 'trunk' |

(4.43) Kaliai-Kove trill in onset clusters and in rhyme position (see *Table 4–6*)

- | | | |
|----|------------------------|-----------------------|
| a. | [yrem] | 'somewhat, slightly' |
| | [mo.krup] | 'frog' |
| b. | [^m bar.ku] | 'spirit mask type' |
| | [na.par] | 'dog's tooth net bag' |
| | [t ^h a.βur] | 'trumpet' |

These data are not problematic for the phonetically-based OT account, as demonstrated earlier in this chapter. In the positions shown above, the tap and trill are governed by two independent and context-free markedness constraints, *FAST and *HOLD, respectively.

When *FAST dominates CONTRAST(dur) and *HOLD, the result is that the trill is optimal in heterorganic clusters and word-finally, as shown in tableau (4.44):

(4.44) Neutralization to trill in heterorganic clusters and word-finally

	*FAST	CONTRAST(dur)	*HOLD
a. CrV ≠ CrV	*!		*
b. CrV	*!	*	
☞ c. CrV		*	*
d. VrC ≠ VrC	*!		*
e. VrC	*!	*	
☞ f. VrC		*	*
g. Vr ≠ Vr	*!		*
h. Vr	*!	*	
☞ i. Vr		*	*

As thoroughly demonstrated throughout this chapter, the CONTRAST(dur), *FAST, and *HOLD constraints may be ranked in different ways, yielding different predicted grammars. The particular ranking of constraints in tableau (4.44) is an expected possibility, which is empirically validated by the behavior of rhotics in Basque and Kaliai-Kove. In contrast, this behavior is completely unexpected on the sonority-based account shown in (4.41).

4.5.2 Syllable Position and Neutralization to Trill in Kairiru and Ngizim

The neutralization of postconsonantal rhotics to trill in Iberian Romance has been analyzed in previous syllable-based accounts as being dependent upon the heterosyllabic status of the consonant + rhotic cluster. Consider the strengthening rule in (4.45), which Harris (1983) posits to account for the data in (4.46):

- (4.45) Underlying tap strengthens to trill after heterosyllabic consonants (Harris 1983)

$$r \rightarrow r / [+cons] _$$

|
Rhyme

- (4.46) Trill is obligatory in syllable-initial postconsonantal position in Spanish

[on.ra]	<i>honra</i>	'honor'
[al.re.ðe.ðor]	<i>alrededor</i>	'around'
[iz.ra.el]	<i>Israel</i>	'Israel'

The consonant + rhotic clusters in (4.46) are all Place-sharing, but the rule in (4.45) treats this as incidental and irrelevant to the strengthening process. Rather, syllable position—more specifically, *heterosyllabicity*—is what conditions neutralization to trill in postconsonantal contexts.

In this chapter, Kairiru and Ngizim were shown to exhibit neutralization to trill in certain consonant-adjacent positions. For instance, only the trill surfaces after homorganic consonants in Kairiru, while the tap and trill are contrastive after heterorganic ones, as seen in (4.47):

(4.47) Neutralization to trill after tautosyllabic homorganic consonants, but contrast after tautosyllabic heterorganic consonants in Kairiru (see *Table 4–8*)

a. After homorganic consonants

[al.sru] 'he chops them down'

[sru] 'pair, brace'

[wun.tru] 'I close the door'

b. After heterorganic consonants

[a.pri.ma.ru] 'he persuades them'

[for.pru] 'spotted snake eel'

[a.qrei] 'it is raining'

[qra.p^ham] 'your shoulder'

In Ngizim, only the trill surfaces before consonants specified as [cor, A₀], as in (4.48), while the tap and trill are contrastive before all other consonants, as in (4.49):

(4.48) Ngizim trill before coronal stops and lateral fricatives (see *Table 4–9*)

sə[r.t]u 'string beads'

a[r.d]aatu 'agree to, approve of'

ga[r.d]u 'cut notch in'

ku[r.n]a 'a thorny tree'

ga[r.ʃ]a 'strong in taste, bitter'

ngu[r.ʒ]adliya 'throat'

(4.49) Ngizim tap/trill contrast before other consonants (see *Table 4–9*)

- a. Before labials
ka[r.m]u 'cut down'
kə[r.m]ai 'chieftainship'
- b. Before alveolar fricatives
ku[r.s]aasiya 'kidney'
bə[r.z]anzan 'rolling around on the ground'
- c. Before palatals
aatə[r.ʃ]an 'perfume'
pə[r.ʃ]i 'lip'
- d. Before velars
tə[r.k]u 'orphan'
tə[r.k]akdu 'repeatedly press on'

In both languages, *homorganicity*—more specifically, Place/stricture-sharing—is the driving force behind neutralization to trill, not syllable position. Since Harris (1983), postconsonantal strengthening in Iberian Romance has been argued to depend on syllable structure. As the above data show, neutralization to trill in Kairiru and Ngizim is not dependent on the syllable position of the rhotic. Neutralized trills occupy the same syllable position as their contrastive counterparts, namely C₂ of complex onsets in Kairiru and coda position in Ngizim.

The phonetically-based OT analysis developed in this dissertation provides a unified account of neutralization to trill in Iberian Romance, Kairiru, and Ngizim. By adopting the Segmental Autonomy hypothesis of Steriade (1999a, 2001a), the analysis formulates phonotactic restrictions on rhotics in strictly linear terms without reference to syllable boundaries. The relevant constraint in this case is *FAST/SAME SITE, which I repeat below from Chapter 3:

- (4.50) *FAST/SAME SITE
 Avoid faster-than-usual articulatory transitions in Place-sharing clusters involving the tongue tip

The Spanish clusters in (4.46), the Kairiru clusters in (4.47a), and the Ngizim clusters in (4.48) all constitute instances of Place/stricture-sharing.⁷⁵ Under such configurations, neutralization to trill is enforced by the *FAST/SAME SITE constraint, which dominates the context-free *HOLD and CONTRAST(dur) constraints in all three languages (and, by hypothesis, in all languages of the rhotic duration hierarchy).

The tableaux in (4.51) through (4.53) illustrate how *FAST/SAME SITE ensures trills in Place/stricture-sharing clusters, while lower-ranked constraints determine the outcome in clusters that do not share Place/stricture:

- (4.51) Neutralization to tap after heterorganic consonants, but to trill in Place/stricture-sharing consonant + rhotic clusters in Spanish

	*FAST/ SAME	*HOLD	*FAST	CONTRAST (dur)
a. C ^v rV ≠ CrV		**!	*	
☞ b. C ^v rV			*	*
c. CrV		**!		*
d. {C ^v r}V ≠ {Cr}V	*!	**	*	
e. {C ^v r}V	*!		*	*
☞ f. {Cr}V		**		*

⁷⁵ Recall our general assumption that rhotic + consonant sequences are not Place/stricture-sharing configurations, which explains why tap can appear before alveolar consonants in Iberian Romance (see Section 3.3.3 of Chapter 3) and before alveolar continuants in Palauan (see Section 4.3.2.1) and Ngizim (see Section 4.4.2.2). In order to account for obligatory trill before alveolar noncontinuants in Ngizim, an additional constraint, RHOCOND, was proposed in (4.29) to ensure Place merger in this position.

(4.52) Tap/trill contrast after heterorganic consonants, but neutralization to trill in Place/stricture-sharing consonant + rhotic clusters in Kairiru

	*FAST/ SAME	CONTRAST (dur)	*HOLD	*FAST
☞ a. $C^v rV \neq CrV$			**	*
b. $C^v rV$		*!		*
c. CrV		*!	**	
d. $\{C^v r\}V \neq \{Cr\}V$	*!		**	*
e. $\{C^v r\}V$	*!	*		*
☞ f. $\{Cr\}V$		*	**	

(4.53) Tap/trill contrast before heterorganic consonants, but neutralization to trill in Place/stricture-sharing rhotic + consonant clusters in Ngizim

	*FAST/ SAME	CONTRAST (dur)	*HOLD	*FAST
☞ a. $Vr^v C \neq VrC$			**	*
b. $Vr^v C$		*!		*
c. VrC		*!	**	
d. $V\{r^v C\} \neq V\{rC\}$	*!		**	*
e. $V\{r^v C\}$	*!	*		*
☞ f. $V\{rC\}$		*	**	

To sum up, the obligatory neutralization of trill in certain clusters in Iberian Romance, Kairiru, and Ngizim is accounted for by one and the same formal mechanism, namely *FAST/SAME SITE. The success of the analysis stems from the fact that this phonotactic constraint makes reference not to syllable position but to the segmental context in which rhotics appear, in accordance with Segmental Autonomy.

4.5.3 Summary

As a phonological constituent, the syllable has played a central role in contemporary phonological theory. This is perhaps nowhere more evident than in the syllable-based accounts of Spanish rhotics reviewed in Chapter 2. However, there are cases in which syllable-based phonotactic statements make the wrong empirical predictions. Steriade (1997, 1999a, 2001a) argues that this is true with respect to patterns of voicing neutralization, aspiration, and place assimilation (see Section 1.2.3.1 of Chapter 1 on voicing neutralization). In this section, we have seen that this is true also with respect to the neutralization of rhotic duration contrast. In Basque, Kaliai-Kove, Kairiru, and Ngizim, the tap and trill pattern in ways that reference to syllable structure alone cannot capture. These patterns are easily accounted for by the phonetically-based OT analysis, which lends further support to Steriade's (1999a, 2001a) hypothesis regarding Segmental Autonomy. In short, phonotactic restrictions on the distribution of rhotics must be formulated in strictly linear terms without reference to syllable boundaries.