Liquid asymmetries in French and Spanish

Laura Colantoni and Jeffrey Steele
University of Toronto

The term ‘liquid’ has become synonymous with ‘l’ and ‘r’ sounds in modern phonetics and phonology. This contrasts with its original meaning, which applied only to the lateral and rhotic that may occur as the second member of a cluster. However, even such a narrow definition of the term proves problematic when attempting to group these segments as a class in French and Spanish, as there are a variety of diachronic and synchronic phenomena in which the lateral and rhotic pattern asymmetrically. These include differences in the evolution of clusters involving liquids from Latin to Romance, in the patterning of the liquids with coronals, and in the phonetic realization and second language acquisition of obstruent-liquid clusters. We propose that the lateral behaves as the optimal liquid in both languages, while the rhotic patterns more with fricatives and may be in the process of leaving the phonological class.

1 Liquids as a class

In modern phonetics and phonology, the term ‘liquid’ has become a synonym for ‘l’ and ‘r’ sounds (Jakobson & Halle, 1968; Chomsky & Halle, 1968; Maddieson, 1980; Ladefoged & Maddieson, 1996, among others). Using this label to describe the laterals and rhotics found in Romance languages as a class proves problematic. Indeed, as shown in Table 1, they include a wide variety of alveolar or palatal laterals, uvular or alveolar trills (sometimes fricativized), and taps, whose articulation and phonotactics vary greatly.

<table>
<thead>
<tr>
<th>Sound</th>
<th>Variety</th>
<th>Init</th>
<th>Med</th>
<th>Fin</th>
<th>LV</th>
<th>CLV</th>
<th>VL</th>
</tr>
</thead>
<tbody>
<tr>
<td>[l]</td>
<td>All</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>[ʎ]</td>
<td>Peninsular Spanish, (NE) Argentine Spanish</td>
<td>✓</td>
<td>✓</td>
<td>*</td>
<td>✓</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>[ɾ]</td>
<td>Spanish</td>
<td>*</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>[ɾ]</td>
<td>Spanish; non-standard French</td>
<td>✓</td>
<td>✓</td>
<td>*</td>
<td>✓</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>[ɾ]</td>
<td>Standard French; Porto Rican Spanish</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>[ɾ]</td>
<td>Spanish (some varieties of Peninsular and Latin American)</td>
<td>*</td>
<td>*</td>
<td>✓</td>
<td>*</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>[ɾ]</td>
<td>Spanish (Argentina, Chile, Ecuador)</td>
<td>✓</td>
<td>✓</td>
<td>*</td>
<td>✓</td>
<td>*</td>
<td>*</td>
</tr>
</tbody>
</table>

Table 1: Laterals and rhotics in French and Spanish

The table here is illustrative and not exhaustive.
A review of the history of the term ‘liquid’ reveals that it was not originally intended to include such a wide variety of sounds. Rather, it was applied to a set of consonants - namely nasals, laterals and rhotics (Grammont, 1965:31; Bourciez & Bourciez, 1967:149; Belardi, 1977:7; Straka, 1979a:364) - that patterned as a class in Classical Greek morphology; these segments were maintained in the formation of the future tense and in nominal declension (Belardi, 1977). Latin grammarians adopted the term and used it to refer to consonants with specific syllabification and prosodic properties. Liquid consonants (which could include the nasals or only refer to ‘l’ and ‘r’) had the unique property of combining with obstruents and of having an ambiguous syllabification, which was determined by metrical needs: in the case of an obstruent-liquid sequence, the obstruent could either syllabify with the preceding vowel or with the following liquid (Belardi, 1977:18-19).

In summary, the original definition included a larger set of sounds (i.e. nasals), and attended to the similarities in the phonotactics of a subset of liquids (i.e. the alveolar lateral and the tap as opposed to all laterals and rhotics), these phonotactics still being observed in modern Romance varieties. In the present work, we will limit our discussion to this subset of laterals and rhotics, given in Table 2, leaving palatal laterals and alveolar trills aside, as well as the issue of the relationship between these segments and nasals to which we will return briefly in the discussion section.

<table>
<thead>
<tr>
<th></th>
<th>Lateral</th>
<th>Rhotic</th>
</tr>
</thead>
<tbody>
<tr>
<td>French</td>
<td>[l]</td>
<td>[r],  [r], [r]</td>
</tr>
<tr>
<td>Spanish</td>
<td>[l]</td>
<td>[r]</td>
</tr>
</tbody>
</table>

Table 2: Phonetic realization of the French and Spanish liquids under analysis

Even if one does narrow the definition of the term ‘liquid’ to include only the laterals and rhotics in Table 2, grouping these segments as a phonetic class proves problematic. For example, Straka (1979:364) comments:

Toutefois, les différences entre les deux catégories, celle de L et celle de R, sont, du point de vue aussi bien acoustique que génétique, si marquées qu’il est préférable de les séparer et de ne pas tenir compte de la vague notion de « liquide ».

In the rest of this paper, we will show that there is indeed evidence that the lateral and rhotic do not form a unified class in French and Spanish given the variety of diachronic and synchronic phenomena in which these segments pattern asymmetrically. The phenomena in question include (i) the evolution of certain clusters involving liquids from Latin to Romance; (ii) asymmetric synchronic patterning with coronals; and differences in the realization of obstruent-lateral vs obstruent-rhotic clusters in both (iii) native French and Spanish, and (iv) second language French. Based on these asymmetries, we propose that the lateral alone behaves as a true liquid. Moreover, we hypothesize that, in both languages, the rhotic is in a transitional state in which it may leave the class either by differentiating itself as an obstruent (both French and Spanish) or becoming more liquid-like (i.e. as an approximant; French alone). Both of these methods
of differentiation are logical for rhotic trills and uvular fricatives, whose articulation is inherently unstable. This instability results from the difficulty in ensuring the necessary aerodynamics for the tap in Spanish or the positioning of the tongue dorsum for frication in French. In those cases where such configurations do not occur accurately in fluent speech, fricatives or approximants are produced (see e.g. Straka, 1979b; Solé, 2002).

In the next section, we review symmetries between /l/ and /ɾ/, which motivate their grouping as a phonological class. In section 3, we then turn to the asymmetries between the two liquids mentioned earlier. Finally, in section 4, we discuss our findings in light of the hypothesis proposed above; we also address the issue of the phonetic versus phonological classification of liquids.

2 Symmetries in French and Spanish liquids

As stated in the preceding section, phonologically French and Spanish laterals and rhotics pattern as concerns syllabification in that both may appear as the second member of a cluster begun by an obstruent.

<table>
<thead>
<tr>
<th>French</th>
<th>Medial</th>
</tr>
</thead>
<tbody>
<tr>
<td>précis [pɾesi]</td>
<td>mépris [mepɾi]</td>
</tr>
<tr>
<td>placer [pləsə]</td>
<td>déplacer [depləsə]</td>
</tr>
<tr>
<td>bravo [bɾavo]</td>
<td>cobra [kəbɾa]</td>
</tr>
<tr>
<td>blaguer [blaɡə]</td>
<td>doubler [dubler]</td>
</tr>
<tr>
<td>frapper [fɾape]</td>
<td>coffret [koɾfe]</td>
</tr>
<tr>
<td>flatter [fɾate]</td>
<td>gifler [ziɾle]</td>
</tr>
<tr>
<td>tracrer [ɾasə]</td>
<td>vitré [viɾe]</td>
</tr>
<tr>
<td>drapør [dɾapo]</td>
<td>poudrer [puɾde]</td>
</tr>
<tr>
<td>craquer [ɾake]</td>
<td>sucrè [suɾe]</td>
</tr>
<tr>
<td>classer [klaser]</td>
<td>boucler [buɾle]</td>
</tr>
<tr>
<td>grater [ɡɾate]</td>
<td>degré [dɾeɾe]</td>
</tr>
<tr>
<td>glacé [ɡɾase]</td>
<td>régler [ɾeɾeɾ]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Spanish</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>prevé [pɾevə]</td>
<td>lepra [lepra] ‘leprosy’</td>
</tr>
<tr>
<td>plegó [pɾeɡo]</td>
<td>sopla [sɔpla] ‘s/he blows’</td>
</tr>
<tr>
<td>bramó [bɾamо]</td>
<td>sobø [sɔˈbre] ‘envelope’</td>
</tr>
<tr>
<td>blasón [bɾason]</td>
<td>tabla [taba] ‘board’</td>
</tr>
<tr>
<td>frenó [fɾeno]</td>
<td>sufri [sufɾi] ‘I suffered’</td>
</tr>
<tr>
<td>flotré [fɾote]</td>
<td>aflora [aflora] ‘it emerges’</td>
</tr>
<tr>
<td>trató [ɾatɾo]</td>
<td>letra [letɾa] ‘letter’</td>
</tr>
<tr>
<td>drogó [dɾoɡo]</td>
<td>sidra [siɾa] ‘cider’</td>
</tr>
<tr>
<td>creyó [kreʒo]</td>
<td>sacra [sakaɾa] ‘holy’</td>
</tr>
<tr>
<td>claro [klaro]</td>
<td>tecla [teˈkla] ‘key’</td>
</tr>
<tr>
<td>grabé [ɡɾaɾe]</td>
<td>logra [loɾa] ‘s/he achieves’</td>
</tr>
<tr>
<td>globo [ɡlobo]</td>
<td>regla [ɾeɾla] ‘ruler’</td>
</tr>
</tbody>
</table>

Table 3. French and Spanish OL clusters
In both languages, these clusters can appear in word initial and medial position,\(^2\) where they constitute branching onsets. In Spanish, these are the only tautosyllabic onset clusters allowed, while in French, they are the most frequent.\(^3\)

Beyond phonotactic similarities, laterals and rhotics can participate in phonological processes, such as dissimilation, as illustrated in (1). Dissimilation of non-contiguous liquids is attested both diachronically (1a) and synchronically (1b). These dissimilatory processes, however, are only documented in Vulgar Latin (Väänänen, 1971), as well as in Romance varieties in which the rhotic is realized as a tap (e.g. Spanish, Catalan; Lloret, 1997; Ohala, 1992).

\[(1) \text{a. Latin: } arbo}_{\text{r}} \rightarrow \text{Spanish: } árbol \quad \text{‘tree’} \\
\text{Latin: } rebu}_{\text{r}} \rightarrow \text{Spanish: } roble \quad \text{‘oak’} \\
\text{b. } peregrino \rightarrow \text{Spanish: } pelegrino \quad \text{‘pilgrim’} \\
cerebro \rightarrow \text{Spanish: } célebro \quad \text{‘brain’} \]

Alternations between liquids not only affect those occurring in a sequence. In several Spanish varieties, coda liquids also participate in substitution processes known as rhotacism and lambdacisms (Lipski, 1994), which are illustrated in (2).\(^4\) These phenomena are usually not categorical, rather the frequency correlates with different sociolinguistic variables (Medina-Rivera, 1999; Broce & Torres Cacoullos, 2002). The substitution of rhotics by laterals and vice-versa is not new, having been noted in early Spanish documents (Lloyd, 1993) and observed during the evolution of Spanish (Fontanella de Weinberg, 1984) and French (Straka, 1979a).

\[(2) \text{mal > mar} \quad \text{‘badly’} \\
por > pol \quad \text{‘by’} \\
verdad > veldad \quad \text{‘truth’} \\
corta > calta \quad \text{‘letter’} \]

Note that people have argued that dissimilation and alternations are motivated by the perceptual similarity between the two segments (Ohala, 1992; Guirao & García Jurado, 1991) and, as such, do not necessarily constitute evidence for a phonological class. Guirao & García Jurado (1991:31) demonstrate that although the lateral and the tap are acoustically different, they are identified using similar cues, specifically both segments rely on the vocalic transitions for their recognition. Consequently, in those varieties in which the rhotic is not realized as a tap, dissimilation and, especially, substitution should be less frequent. Modern French confirms this hypothesis, as the rhotic, which is realized as a dorsal fricative, fails to alternate with the lateral.

---

\(^2\) In French, such clusters can also appear word-finally (e.g. aigle [e̞gl] ‘eagle’, gifle [ziːfl] ‘slap’; lettre [lɛtʁ] ‘letter’, gauffre [ɡoːfr] ‘waffle’).

\(^3\) Of the 56174 entries in the electronic version of the *Petit Robert* dictionary, 39198 contain a CC cluster. Of this latter number, 15470 (39.5%) involve obstruent-liquid sequences.

\(^4\) While rhotacism is not observed in French, it does occur in other Romance varieties found in France; see Straka (1979a:400-405) for discussion.
In summary, phonotactic similarities and participation in processes, such as dissimilation and substitution, motivate the grouping of French and Spanish liquids as a phonological class. Of these motivations, phonotactics are the strongest, given that dissimilatory processes may be conditioned by the phonetic realization of the segments. In the next section, we will examine a variety of asymmetries which provide strong counterevidence against this grouping.

3 Asymmetries in French and Spanish liquids

A careful comparison of French and Spanish laterals and rhotics reveals a considerable number of inter- and intra-language asymmetries, which may put into question their constituting a unified phonetic class. French and Spanish laterals and rhotics differ articulatorily and acoustically; and, as a consequence, they display an asymmetric behaviour in some processes. In this section, we detail these asymmetries, which are both diachronic and synchronic in nature. Before doing so, we briefly outline the articulatory and acoustic properties of the segments in question.

3.1 A brief articulatory and acoustic characterization of French and Spanish ‘l’ and ‘r’

In both French and Spanish, the lateral is a voiced alveolar approximant, whose active articulator is the tip of the tongue in French (Grammont, 1965), or the tip or blade in Spanish (Navarro Tomás, 1970). As such, /l/ can be characterized as a sonorant, continuant segment. In contrast, in Spanish, the rhotic is a voiced alveolar tap, which is articulated with the tip of the tongue, and is traditionally described as a slightly retroflex segment (Navarro Tomás, 1970:§112). The French rhotic is most commonly realized as a voiced dorsal fricative; approximant realizations are also observed (e.g. O’Shaughnessy, 1982:390). Moreover, there is considerable inter- and intraspeaker variation (see e.g. Straka, 1979c:493-499 for Parisian French; Tousignant, 1987 for Montreal French). Thus, phonologically, the rhotic is a voiced coronal non-continuant segment in Spanish, and a voiced dorsal continuant consonant in French.

Lateral segments can be acoustically characterized by the presence of clearly defined formant patterns. Two resonators are involved in the production of laterals (Fant, 1968): (1) the one formed by the opening on both sides of the tongue; as well as (2) the cavity on top of the tongue. In addition, lateral segments can be distinguished from the following vowel by an abrupt change in formant transitions, especially for apical laterals, and depend on the formant transitions for their identification (Guirao & García Jurado, 1991). Again, rhotics in French and Spanish differ acoustically. Spanish <r> can be described as a short voiced closure of approximately 20 ms (Borzone de Manrique, 1980; Guirao & García Jurado, 1991; Quilis, 1993). In French, the rhotic is generally a voiced fricative; however, it can also be devoiced or realized as an approximant with clearly defined formants (O’Shaughnessy 1982:390-391).

---

5 Some authors (Cressey, 1978; Núñez Cedeño & Morales Front, 1998) treat Spanish laterals as [-continuant] and rhotics as [+continuant]. We will follow Quilis (1993) and Martínez Celdrán (1997) here, who claim that the lateral is continuant, since acoustically, laterals are periodic sounds, while the rhotic tap is a short stop, i.e. non-continuant.
We now turn from articulatory and acoustic descriptions of the liquids to focus on asymmetries in their patterning.

### 3.2 Diachronic asymmetries

In both French and Spanish, certain clusters involving liquids evolved differently from Latin depending upon whether the liquid was a lateral or rhotic; we begin with obstruent-liquid (OL) clusters in Spanish. While some OL clusters present in Latin persisted, others were reduced to one of the members of the cluster or replaced by a different consonant altogether. Although there are exceptions to the general tendencies, for the most part, there was an asymmetric evolution of obstruent-lateral clusters versus their obstruent-rhotic counterparts. While obstruent-lateral clusters underwent assimilation and eventually palatalization as shown in (3a), in the case of obstruent-rhotic clusters, either the whole cluster was maintained, as in (3b), or the liquid alone survived (Lloyd, 1993; Penny, 2002).

(3) a. Latin *clavis* > Spanish: *llave* [ʎaBe] ‘key’
   Latin: *plorare* > Spanish: *llorar* [ʎɔrɛr] ‘to cry’

b. Latin: *grande* > Spanish: *grande* ‘big’
   Latin: *quadru* > Spanish: *cuadro* ‘picture’

In French, the evolution of liquid-obstruent clusters showed a similar asymmetry. The lateral of liquid-obstruent clusters was vocalized to [u], which fused with the preceding vowel (4a). In contrast, the rhotic of such clusters was maintained (4b; e.g. Bourciez & Bourciez, 1967).

(4) a. Latin: *pulmone* > French: *poùmon* ‘lung’  
   Latin: *alba* > French: *aùbe* ‘sunrise’

b. Latin: *firmare* > French: *fermer* ‘to close’
   Latin: *barba* > French: *barbe* ‘beard’

### 3.3 Coronal asymmetries

Laterals and rhotics also show synchronic asymmetries in coronal obstruent-liquid clusters. As shown in (5a,b) for French and most varieties of Spanish, tautosyllabic coronal-lateral clusters are categorically banned whereas coronal-rhotic sequences are widely attested.

(5) a. French  
   *travail* [tʁavaj] ‘work’
   *tlaie* [tle]  
   *drapeau* [dʁapo] ‘flag’
   *dlore* [dloɛ]  

---

6 In some varieties (e.g. Argentine, Mexican Spanish), such clusters are permitted word-internally (e.g. *atlas* [a.tlas]).
LIQUID ASYMMETRIES IN FRENCH AND SPANISH

b. Spanish

\textit{trabajo} \quad [\textipa{traβaxo}] \quad ‘work’

\textit{tlama} \quad [\textipa{tlama}] \quad * ‘drama’

\textit{drama} \quad [\textipa{dra.ma}] \quad ‘drama’

\textit{dlama} \quad [\textipa{dlama}] \quad *

Asymmetrical patterning with coronals is also observed in Spanish liquid-obstruent clusters in spirantization. Spirantization, a process in which an underlying stop becomes an approximant, generally applies in intervocalic environments but is blocked after nasals. The behaviour of liquids reveals an interesting asymmetry, with /b, d, g/ being realized as approximants after the tap (6a). In contrast, a lateral preceding /d/ blocks the application of the process (6b) (Goldsmith, 1981; Harris, 1983; Mascaró, 1984; Hualde, 1989; Lipski, 1993, among others).

(6) a. \textit{verde} \quad [\textipa{berøe}] \quad ‘green’

\textit{sordo} \quad [\textipa{soRo}] \quad ‘deaf’

b. \textit{caldo} \quad [\textipa{kal.do}] \quad ‘broth’

\textit{molde} \quad [\textipa{molde}] \quad ‘mold’

Both of the Spanish coronal asymmetries can be explained with reference to the findings of recent articulatory studies. Romero (1996:106) observes that in the realization of lateral-obstruent clusters, there is an overlapping of the two consonantal gestures, whereas rhotic-obstruent clusters are realized as a sequence. The author motivates this asymmetry arguing that there is a difference in the location of the constriction for both liquids, with the rhotic having a more retracted articulation. This claim is also supported by findings for Catalan and Spanish by Recasens & Pallarès (2001). The authors point out that the rhotic and the lateral differ in anteriority, with the lateral being more anterior. If the two liquids differ in place, then, the phonotactic gap (i.e. the absence of coronal-lateral clusters) would be accounted for by an obligatory contour principle constraint (McCarthy, 1986, among others) against two adjacent homosyllabic consonants with identical place specification. On the other hand, the blocking of spirantization would also be motivated by these same articulatory findings. If the lateral is articulated with a closure at the same location as that of the obstruent, the lateral closure would reinforce the obstruent closure. The spirantization in rhotic-obstruent clusters would be accounted for by the fact that the two consonantal segments differ in the location of the constriction. In addition, experimental findings (Malmberg, 1950; Quilis, 1970; Guirao & García Jurado, 1991) demonstrate that, in the case of rhotic-obstruent clusters, the two consonants are not phonetically adjacent, since the cluster is broken up by an epenthetic vowel. Thus, a different place of articulation and the presence of the vowel would account for the fact that obstruents spirantize after rhotics.
3.4 Asymmetries in the phonetic realization of obstruent-liquid clusters

The asymmetries observed in Spanish liquid-obstruent clusters as concerns spirantization mirror asymmetries in obstruent-liquid clusters in native French and Spanish, as well as in French acquired as a second language.

Colantoni & Steele (2004) demonstrate that there are important differences in the phonetic realization of obstruent-lateral versus obstruent-rhotic clusters. The data were elicited from ten speakers of Quebec French and eleven speakers of Argentine Spanish, who read a list of carrier sentences three times including 48 words containing the target obstruent-liquid clusters. The stimuli were designed to control for the type of lateral and the position of the cluster in the word, including stress.

The results, which are summarized in Table 4, demonstrate the existence of a strong epenthesis asymmetry between obstruent-lateral and obstruent-rhotic clusters. In both languages, there was virtually no epenthesis with laterals, whereas there was variable epenthesis with rhotics. While epenthesis with rhotics had been previously documented for Spanish (Malmberg, 1950; Quilis, 1970; Guirao & García Jurado, 1991, among others), it had not been attested in French (e.g. Rochette, 1973).

<table>
<thead>
<tr>
<th>Cluster</th>
<th>French</th>
<th></th>
<th>%</th>
<th>Spanish</th>
<th></th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obstruent + /l/</td>
<td>9</td>
<td>599</td>
<td>1.5</td>
<td>11</td>
<td>591</td>
<td>1.9</td>
</tr>
<tr>
<td>/fr/</td>
<td>3</td>
<td>122</td>
<td>2.5</td>
<td>168</td>
<td>198</td>
<td>84.9</td>
</tr>
<tr>
<td>/p,t,k/ + /r/</td>
<td>20</td>
<td>356</td>
<td>5.6</td>
<td>339</td>
<td>360</td>
<td>94.2</td>
</tr>
<tr>
<td>/b,d,g,/ + /r/</td>
<td>320</td>
<td>356</td>
<td>89.9</td>
<td>386</td>
<td>395</td>
<td>97.7</td>
</tr>
<tr>
<td></td>
<td>352</td>
<td>1433</td>
<td></td>
<td>922</td>
<td>1544</td>
<td></td>
</tr>
</tbody>
</table>

Table 4. Rate of epenthesis in French and Spanish OL clusters

In French, where the rhotic is realized as a fricative, the overall rate of epenthesis was lower than in Spanish, with epenthetic vowels occurring almost exclusively in voiced obstruent-rhotic clusters (see Figure 1).

Figure 1. Epenthetic vowel in French voiced obstruent-rhotic cluster (target *cobra* /kɔbʁa/ ‘cobra’)

LAURA COLANTONI AND JEFFREY STEELE
In contrast, in Spanish, where the rhotic is realized as a tap, epenthesis is observed in both voiceless (Figure 2) and voiced clusters (Figure 3) across the board. As argued in Colantoni & Steele (2004), the presence versus absence of the cluster-medial epenthetic vowel correlates with the number of phonetic properties shared by the obstruent and liquid. The more similar the two segments in terms of place, manner and voicing, the greater the probability of dissimilation via epenthesis. In Romance languages, the lateral is less similar to the obstruent in manner (i.e. it is more vowel-like). In contrast, the rhotic is obstruent-like, being lower in sonority (French and Spanish) or non-continuant (Spanish alone).

![Figure 2. Epenthetic vowel in Spanish voiceless obstruent-rhotic cluster (target *crema* /krema/ ‘cream’)](image1)

![Figure 3. Epenthetic vowel in Spanish voiced obstruent-rhotic cluster (target *drama* /drama/ ‘drama’)](image2)

The French data are marked by a double asymmetry, namely that between the lateral and rhotic summarized in Table 4, as well as an asymmetry involving voiceless versus voiced stops in rhotic clusters. As shown in Figure 4, when the rhotic was
preceded by a voiceless stop, the most frequent strategy was assimilation, which included affrication in those cases where the consonants agreed in place (e.g. *crée* [kʁe] *(s/he) creates*, *décrasser* [dekʁe] *(to clean up*)). Assimilation was not observed in Spanish, where the rhotic is non-continuant. Assimilation with laterals in French, although attested, is significantly less frequent, and is mostly restricted to /kl/ clusters. Interestingly, the distribution summarized in Figure 4 mirrors the evolution of Latin obstruent-liquid clusters discussed in §3.2 above. As in the history of Spanish, rhotics and laterals, as well as voiceless and voiced obstruents, evolved asymmetrically.

![Figure 4. Liquid assimilation in French](image)

Asymmetries in stop-lateral versus stop-rhotic clusters are not restricted to native speakers. Data from Steele (2002) show that L2 learners of French acquire such clusters differently. Steele investigated beginner Mandarin-speaking learners’ acquisition of stop-lateral clusters in initial, medial and final position. A comparison of the results for lateral (Table 5) and rhotic targets (Table 6) reveals that stop-lateral clusters were realized more accurately, i.e., were acquired more quickly.

Inspection of the tables also reveals that there was greater variability in the realization of the rhotic. While all of the learners’ realizations of /l/ were target-like, in the case of the rhotic, French /ʁ/ was realized as [ʁ], [ʁ], [ʁ] and [h]. Furthermore, there were also a significant number of cases of deletion, as indicated in the column labelled ‘[C]’.

<table>
<thead>
<tr>
<th>Target Type</th>
<th>Example</th>
<th>N</th>
<th>[Cl]</th>
<th>[C∅l]</th>
<th>[Cl∅]</th>
<th>[C∅l∅]</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIV</td>
<td>plie</td>
<td>54</td>
<td>.31</td>
<td>.61</td>
<td></td>
<td></td>
<td>.92</td>
</tr>
<tr>
<td>CIVCV</td>
<td>clocher</td>
<td>55</td>
<td>.67</td>
<td></td>
<td>.25</td>
<td></td>
<td>.92</td>
</tr>
<tr>
<td>CVCIV</td>
<td>réglet</td>
<td>50</td>
<td>.66</td>
<td>.28</td>
<td></td>
<td></td>
<td>.94</td>
</tr>
<tr>
<td>CVCIVCV</td>
<td>bouclier</td>
<td>50</td>
<td>.90</td>
<td>.08</td>
<td></td>
<td></td>
<td>.98</td>
</tr>
<tr>
<td>CVCVCVC</td>
<td>bicycle</td>
<td>51</td>
<td>.02</td>
<td>.61</td>
<td>.22</td>
<td></td>
<td>.85</td>
</tr>
</tbody>
</table>

Table 5. Beginner Mandarin-speaking learners’ acquisition of French stop-lateral clusters
### Liquid Asymmetries in French and Spanish

<table>
<thead>
<tr>
<th>Type</th>
<th>Target</th>
<th>Example</th>
<th>N</th>
<th>Learner syllabification of /Cʁ/ cluster</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>CʀV</td>
<td>pré</td>
<td>78</td>
<td></td>
<td>[Cʁ] [C] [Cʁx] [Cʁh]</td>
<td>.88</td>
</tr>
<tr>
<td>CʀVCV</td>
<td>drapeau</td>
<td>75</td>
<td></td>
<td>.18 .27 .06 .22 .15</td>
<td></td>
</tr>
<tr>
<td>CVCʁV</td>
<td>cobra</td>
<td>47</td>
<td></td>
<td>.21 .33 .02 .09 .13</td>
<td>.73</td>
</tr>
<tr>
<td>CVCʁVCV</td>
<td>tigridie</td>
<td>55</td>
<td></td>
<td>.11 .60 .02 .11</td>
<td>.84</td>
</tr>
<tr>
<td>CVCʁV</td>
<td>chapitre</td>
<td>70</td>
<td></td>
<td>.11 .17 .03 .01</td>
<td>.32</td>
</tr>
</tbody>
</table>

Table 6. Beginner Mandarin-speaking learners’ acquisition of French stop-rhotic

In summary, asymmetries in clusters can be used as a diagnostic for differences between the two liquids, and as such, provide a reason to challenge their inclusion in one phonetic class. If the two liquids did not differ in sonority and/or manner, the clear asymmetries reported would not be motivated.

#### 3.5 Asymmetries in liquid phonetic patterning vis-à-vis fricatives and nasals

In the introduction, we saw that the original use of ‘liquid’ as defined by Greek grammarians designated laterals, rhotics and nasals, to the exclusion of other consonants, including fricatives. In this section, we will look at two asymmetries in phonetic patterning involving laterals and rhotics. In the case of French, we will see that the rhotic patterns with fricatives, that is, outside the class of liquids. In the case of Spanish, the assimilatory patterns of laterals mirror those of nasals, with rhotics behaving differently.

In French, stressed vowels followed by voiced fricatives including [ʁ] (7a) are phonetically longer than the same vowels followed by all other consonants, including [l], as shown in (7b).

(7) a. French lengthening consonants
   
   - **vive** [vi:v] ‘lively’
   - **rose** [ʁoːz] ‘rose’
   - **beige** [beːʒ] ‘beige’
   - **air** [ɛʁ] ‘air’
   
   b. **ville** [vil] ‘city’
   - **rauque** [ʁok] ‘raspy’
   - **bête** [bet] ‘stupid’
   - **aile** [ɛl] ‘wing’

The patterning of [ʁ] with the other French fricatives is consistent with the hypothesis forwarded earlier that rhotics are the unstable member of the liquid class, and thus may pattern with non-liquids, including obstruents.

In contrast, laterals, as good liquids, may behave like other sonorants including nasals. Several authors have noticed (e.g. Navarro Tomás, 1970; Cressey, 1978) that laterals and rhotics in Spanish differ in terms of their assimilatory patterns. Laterals tend to assimilate to the following consonant, as illustrated in (8), whereas rhotics do not. In this case, then, laterals behave like Spanish nasal consonants, which always assimilate in place to the following consonantal segment.
Spanish lateral assimilation (Navarro Tomás, 1970: §111)

\( \text{alzar} \ [\text{al}0\text{ar}] \) ‘to lift’

\( \text{colcha} \ [\text{ko}l\text{t}a] \) ‘blanket’

4 Discussion and conclusion

As discussed in §2, there are phonological motivations for grouping ‘l’ and ‘r’ under the category of ‘liquids’, with phonotactic similarities being the strongest of these. In contrast, in §3, we examined considerable evidence which puts into question the validity of such a class. This evidence includes the diachronic evolution of obstruent-liquid clusters in Spanish and liquid-obstruent clusters in French, coronal asymmetries, differential realization of stop-liquid clusters, and asymmetries in the phonetic patterning of liquids with respect to fricatives and nasals. As argued for the epenthesis asymmetries in particular discussed in §3.4, the dissimilar patterning of the French and Spanish laterals and rhotics are arguably related to differences in their phonetic realization as concerns place, manner and sonority.

The types of evidence used to argue for the class of liquids in §2, namely phonotactics and processes of assimilation and dissimilation, versus the principally phonetic asymmetrical patterning forwarded to argue against the grouping of French and Spanish laterals and rhotics as a class reveal a potential conflict between phonological and phonetic classes. Even if liquids were not a phonetic class, could they still constitute a phonological class? In order to answer affirmatively, one must name the phonological feature(s) shared by the laterals and rhotics to the exclusion of other segments. We have seen that the lateral and the rhotic differ in place and manner features in both languages. However, they are generally voiced. Given that voicing is non-contrastive for liquids, they have been analyzed as having an SV node (e.g. Avery & Rice, 1989; Piggott, 1992). As such, laterals and rhotics could constitute a class.

In spite of this possible shared representation, the asymmetries discussed in this paper have repeatedly demonstrated that the rhotic in both French and Spanish may pattern asymmetrical from the lateral. Moreover, as concerns their phonetic realization, the lateral is a true sonorant since it is always continuant and voiced, and, most importantly, never alternates with obstruents. In contrast, the rhotic is non-continuant in Spanish, and non-periodic in both languages. In French, the rhotic is realized as a fricative, and pattern with other voiced fricatives in terms of vowel lengthening to the exclusion of laterals and obstruents. In Spanish, although the rhotic is realized as a tap in the varieties analyzed here, they may become obstruents. It is well documented the fact that taps and trills in Spanish are realized as fricatives in several varieties (Lipski, 1994; Penny, 2000; Colantonì, 2001).

Rhotics, probably due to their articulatory and perceptual characteristics, are an unstable member of the class, with a higher chance of becoming either obstruents (French and Spanish) or approximants (French). It is possible to imagine that we are witnessing a stage in the evolution of these rhotics during which they are fluctuating between more or less sonorant segments, the most likely consequence of which being that they may eventually leave the class of liquids. Note that, while the hypothesis forwarded here that the lateral is the optimal liquid receives support in the asymmetries discussed, it is necessary to further investigate it minimally with data from other Romance varieties.
Moreover, testing the hypothesis concerning the future membership of the rhotics in the class of liquids will require a real-time study. We predict that the types of asymmetries found in French and Spanish will be found elsewhere.

References


