Storme, Benjamin

The distribution of /ʁ/ in French and Haitian: more evidence for the role of perception

Introduction. In this paper, we present new empirical evidence for the hypothesis that the restrictions on the distribution of /ʁ/ in French and in Haitian Creole, a French-based creole, are perceptually motivated (Russell Webb 2010). The analysis is couched within the framework of the Dispersion Theory of Contrast (Flemming 2002), a theory predicting that phonological contrasts are neutralized preferentially in contexts where they are less perceptible. We present preliminary results of two perception experiments supporting the perceptually-based analysis of the distribution of /ʁ/ and providing a potential explanation for why /l/ in Haitian was not subject to deletion in the same environments as /ʁ/. Syllable-based analyses of the same data are compared and shown to be empirically weaker.

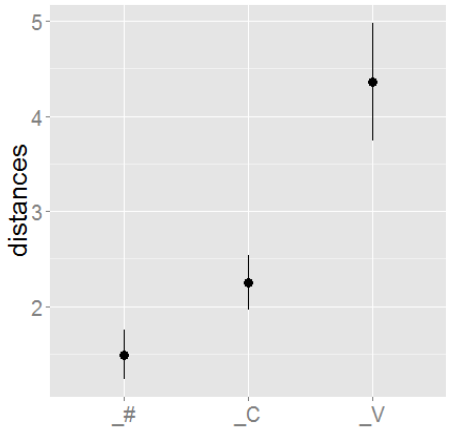
Data. Synchronic and diachronic data in French and Haitian Creole show that the distribution of the phoneme /ʁ/ is sensitive to the post-/ʁ/ context. /ʁ/ in Haitian was only retained in pre-vocalic and pre-glide position: etymological /ʁ/'s in pre-consonantal or word-final positions have no correspondent in Haitian Creole (see Table 1). This asymmetry is also reflected in the history of French: /ʁ/'s were more instable pre-consonantally and word-finally than pre-vocalically and before a glide (Zinc 1986). Data also suggest a further asymmetry between word-final and pre-consonantal /ʁ/'s, the latter being more robust to deletion than the former (Russell Webb 2010). In contrast with /ʁ/, the distribution of /l/ does not show a strong sensitivity to the post-/l/ context in French and Haitian: /l/ was generally retained in environments where /ʁ/ was lost in Haitian, except in word-final position after a consonant (e.g. French *siècle* [sjɛkl] ∼ Haitian *syèk* [sjɛk] "century").

	French	Haitian	
ʁV	crapaud /kʁapo/	krapo /kʁapo/	"toad"
ʁGV	mariage /maʁjaʒ/	maryaj /maʁjaʒ/	"wedding"
VʁC	parler /paʁle/	pale /pale/	"talk"
Vʁ#	la mer /lamɛʁ/	lamè /lamɛ/	"sea"
VCʁ#	maigre /mɛgʁ/	mèg /mɛg/	"skinny"

Table 1: /ʁ/ in French and Haitian (Valdman 1996)

Analysis. In an acoustic study, Russell Webb (2010) showed that the spectral profile of French word-final /ʁ/ is characterized by significantly less robust acoustic energy above 1,000 Hz than pre-vocalic /ʁ/. Based on this result, he proposed that cue robustness is responsible for the asymmetry in the phonological behavior of pre-vocalic /ʁ/ and word-final /ʁ/ in French and Haitian. We extend this analysis to pre-consonantal /ʁ/. More specifically, we propose that the asymmetric phonological behavior of /ʁ/ results from its greater confusability with the empty segment ∅ in word-final position than in non-word-final position, and before a non-glide consonant than before a vowel. The effect of the perceptibility of /ʁ/ on its phonological behavior is modeled as resulting from the interaction of constraints favoring more perceptible contrasts (MinDist constraints) and a constraint favoring a larger number of contrasts across contexts (MaxContrast constraint). There is a different MinDist constraint for the /ʁ/ ∼ ∅ contrast in each of the three relevant contexts, pre-vocalically (_V), pre-consonantally (_C), and word-finally (_#). These constraints are ranked such that a contrast is more penalized in a context where it is less distinct than in a context where it is more distinct (MinDist = ʁ-∅/_# ≫ MinDist = ʁ-∅/_C ≫ MinDist = ʁ-∅/_V). /ʁ/ in Haitian and in older variants of French are assumed to be perceptually similar enough to Modern French /ʁ/ to be subject to the same contextual effects (see Russell Webb 2010). These languages then only differ from the variant of Modern French where /ʁ/'s are present in all three contexts in the ranking of the MaxContrast constraint: MaxContrast is outranked by the two higher-ranked MinDist constraints in Haitian, and by the highest-ranked MinDist constraint alone in varieties of French with word-final /ʁ/ deletion.

Experiment 1. We tested the hypothesis that the perceptibility of /ʁ/ decreases in the order ʁV > ʁC > ʁ# using a perception experiment based on a forced-choice word identification task. Two native speakers of French (a male and a female) were recorded reading nonce words varying by the presence/absence of /ʁ/ in 6 conditions: /am{i, a}{ʁ, ∅}{o, to, #}/. The sound files were mixed with noise and played to native French participants in random order in an online setting. Upon hearing the stimulus, participants were asked to choose whether they heard the word with or without /ʁ/ (e.g. *amar*/*ama*). The results were analyzed using a detection theory model fit via Probit regression, predicting the probability of each response (ʁ/∅) given the stimulus (ʁ/∅) and the context.



Perceptual distance between /ʁ/ and ∅ as a function of the following context.

The estimates of the perceptual distance between /ʁ/ and ∅ as a function of the following context are shown in the figure. As predicted, this distance was found to be significantly larger before a vowel than in the two other contexts ($p < .001$), and before C than in word-final position ($p = .050$).

Experiment 2. A second perception experiment was run with the same participants to test whether the perceptibility of /l/ was impacted in a similar way by the following context. /l/ was not found to be significantly less perceptible word-finally or before a consonant than before a vowel. The fact the perceptibility of /l/ is not affected by the environment in the same way as that of /ʁ/ might help explain why /l/ and /ʁ/ pattern differently in Haitian Creole and only the second one was subject to deletion word-finally and pre-consonantally.

Syllable-based analyses. Alternative analyses of the distribution of /ʁ/ in French and in Haitian have been proposed where syllable structure plays an important explanatory role (e.g. Brousseau & Nikiema 2006). In these accounts, the difference between the distributions of /ʁ/ in French and Haitian Creole is captured in terms of (i) an abstract markedness scale where codas are more marked than onsets and (ii) a preference for unmarked structures. However, this type of analyses makes problematic predictions. Post-vocalic word-final /ʁ/'s (e.g. in *mer*) and non-word-final pre-consonantal /ʁ/'s (e.g. in *parler*) are treated equivalently as codas and are therefore predicted to behave identically. However, they don't, as shown by the fact that word-final /ʁ/'s are more prone to delete in French. Also, word-final CʁC clusters are analyzed as onset clusters in many analyses of syllable structure in French (e.g. Féry 2003). This is because they are rising sonority clusters and can be preceded by tense mid vowels in Standard French (e.g. *autre* [otʁ(ə)] "other"). As onset clusters, word-final Cʁ clusters are predicted to be licit in Haitian Creole. However, they are not (e.g. French *maigre* /mɛgʁ/ vs Haitian *mèg* /mɛg/ "skinny"). In the current proposal, it is not surprising that word-final post-vocalic and post-consonantal [ʁ]'s behave alike as they both share the crucial property of not being followed by a vowel.

Conclusion. We proposed a perceptually-based analysis of the distribution of /ʁ/ in French and Haitian Creole whose predictions are supported by the results of a perception experiment. This work contributes to the growing body of evidence suggesting that the distribution of sounds is better explained in segmental terms than in syllabic terms (Steriade 2001, Wright 2004).

Selected references. Brousseau, A.-M. & Nikiema, E. 2006. From Gbe to Haitian: the Multi-Stage Evolution of Syllable Structure. In *L2 Acquisition and Creole Genesis*, 295-330 • Flemming, E. 2002. *Auditory Representations in Phonology.* Routledge • Russell Webb, E. 2010. Creole phonological restructuring: The role of perception in contact-induced change. *Journal of Pidgin and Creole Languages* 25:2, 263-288.