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Speech imitation between speakers influences the realization of initial rises in French intonation

Amandine Michelas and Noël Nguyen

Laboratoire Parole et Langage, Aix-Marseille Université & CNRS, Aix-en-Provence

michelas@lpl-aix.fr, noel.nguyen@lpl-aix.fr

Over the last few years, interest in imitation has widened across many disciplinary fields, including phonetics and phonology. Within these fields, a growing number of studies have shown that the tendency of speakers to imitate each other during a conversational exchange affects not only segmental features but also suprasegmental attributes such as rate of speech and silent pauses (?), vocal intensity (?) or pitch (???, *inter alia*). However, little is known about how imitation affects intonation, especially in a language like French that has no lexical stress.

In French, stress is postlexical and pertains to a phrasal domain which is smaller than the intonation phrase. In Jun & Fougeron's autosegmental-metrical model of French intonation (?) casted within the autosegmental-metrical framework of intonation, this domain is called the Accentual Phrase or AP. The AP is characterized by the presence of a typical final f0 rise (LH*) on the last syllable of the phrase which is lengthened. In addition, an optional initial rise (LHi) may appear near the beginning of the AP (i.e. generally on the first syllable of the first content word occurring in the phrase). Figure 1 shows the Noun Phrase "la maison de Monet" *Monet's house* where the first AP "La maison" can be either pronounced with only a final rise (LH*, left) or with an additional initial High tone (LHiH*, right). Both the early and late rises can be described as a sequence of Low and High tones, but only the final rise is a pitch accent associated with a metrical strong syllable. When all four tones are produced, the tonal pattern of the AP is LHiLH*. Other attested sequences can be formed by the absence of one or more tones (LLH*, LHiH* and HiLH* and LH*). The factors favouring the production of the initial rise are not entirely clear, but have been claimed to include a large number of syllables in the phrase and a slow speaking rate (???, *inter alia*). In this study, we argue that speech imitation between speakers is another factor influencing the realization of initial rises in French. Specifically, we hypothesized that participants in a shadowing task would produce more initial H tone when they heard a stimulus including both initial and final H tones than when only a final H tone was present in the auditory stimulus.

21 pairs of noun phrases whose segmental structure was identical but differing in the potential placement of an initial High tone near the beginning of the first AP were presented to listeners (Figure 1). In a shadowing task, 6 native speakers of French (3 males and 3 females) listened to target phrases and were instructed to repeat them, first, without any instructions to imitate stimuli (repetition task), and then with explicit instructions to imitate the speaker's way of producing the stimuli (imitation task).

We employed a mixed logit model to examine if auditory stimuli influenced the realization of initial H tones in the tonal patterns produced by speakers. The results showed that the tonal pattern of the auditory stimuli had a significant effect on tonal patterns produced by participants ($\beta=2.8$, $se=0.49$, $z=5.79$, $p<0.0001$) while the kind of task (repetition vs. imitation) had no significant effect ($\beta =1.0$, $se=0.5147$, $z=1.867$, $p=0.052$). Percentages of tonal patterns produced by participants which include either only a final H target (without Hi Response) or an additional/initial H target (Including Hi Response) during the two tasks for both Without Hi Stimuli and Including Stimuli are shown in Figure 2.

First, in contrast with previous studies on French intonation suggesting that initial accents are difficult to identify (??), our results indicate that participants readily differentiated among the stimuli including only a final H tone and stimuli including an additional/optional initial H tone. Secondly, we found that participants produced more initial H tones when they heard a stimulus including both initial and final H tones than when only a final rise was present; this was true for both tasks. These findings suggest that between-speaker speech imitation influences the realization of initial rises in French intonation and highlights the need to include a between-speaker accommodation mechanism in models of speech production.

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Figure 1: f0 contour for two noun phrases “La maison de Monet” pronounced in isolation (as an Intonation Phrase) with only a final rise (LH*, left) and with an additional/optional initial high tone (LHiH*, right).

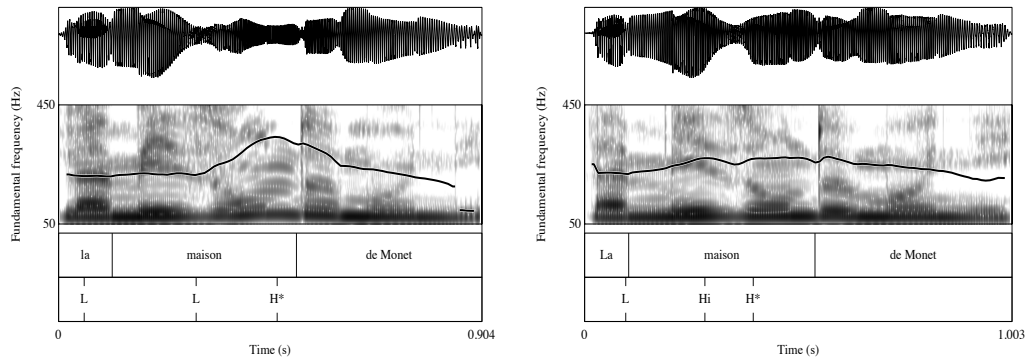
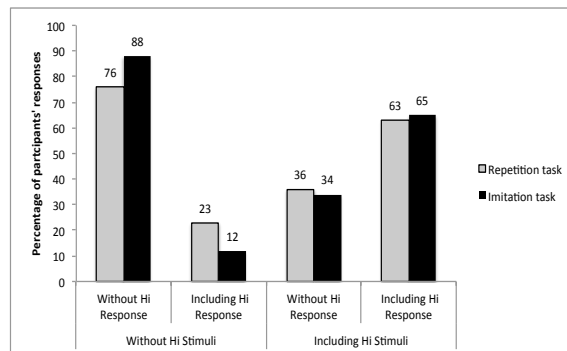


Figure 2: Percentages of responses including only a final H tone (Without Hi responses) or with an additional initial H tone (Including Hi responses) for stimuli including only a final H tone (Absence of Hi in the stimuli) or an additional initial H tone (Presence of Hi in the stimuli) for both repetition and imitation tasks.



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