Beat gestures and prosodic phrasing in French

Patrick Louis Rohrer[1,2], Pilar Prieto[2,3] & Elisabeth Delais-Roussarie[1]

[1]Université de Nantes, UMR 6310-LLING, France
[2]Universitat Pompeu Fabra, Catalonia
[3]Institució Catalana de Recerca i Estudis Avançats (ICREA), Catalonia

Previous studies have concluded that co-speech gestures are produced in a temporally coordinated way with prosodic prominence (Kendon, 1980; McNeill, 1992). More granularly, some studies have found that strokes and particularly apexes are coordinated with pitch accentuation (Jannedy & Mendoza-Denton, 2005; Loehr, 2012; Esteve-Gibert & Prieto, 2013, among others). Further, it is often said that beat gestures (McNeill, 1992) tend to be tightly coupled with prosody and rhythmic marking. However, few studies have specifically looked at the relationship between beat gestures and prosodic prominence, mostly with mixed results. McClave (1994) found while some beat gestures co-occur with nuclear pitch accents, many do not. Instead she proposes a rhythmic spacing between subsequent beat gestures. A more recent study by Shattuck-Hufnagel & Ren (2018) found that pitch-accented syllables and the strokes of beat gestures co-occurred at a rate of 83.1% in a 20-minute speech sample.

However, these two studies have investigated English, and the other previously-mentioned studies have explored languages where pitch accentuation tends to have a prominence-lending function. No studies have investigated French, where a main function of pitch accentuation is to mark prosodic boundaries. Indeed, the smallest prosodic phrase in French consists of an obligatory, phrase-final pitch accent (henceforth Hf) and an optional initial accent (henceforth Hi) that is said to mark the left edge of the prosodic phrase (e.g., Welby, 2006). Specifically we ask if beat gestures are indeed tightly coupled with pitch accentuation in French, where pitch accents are mainly demarcative in function. We also explore if the beat gestures that are not associated with pitch accentuation may be marking prosodic phrasing.

A corpus analysis of Ted Talks is being carried out. This represents an academic-style speech which has been shown to generally contain a higher rate of non-referential gesture production (*i.e.*, Shattuck-Hufnagel & Ren, 2018). Videos from TedX-sponsored events were downloaded and encoded for gesture annotation in ELAN (29.97 FPS; Wittenburg et al., 2009)[1]. The audio files were extracted (48 kHz) and prosody was separately annotated in PRAAT following French_ToBI standards (Boersma, 2001; Delais-Roussarie et al, 2015). Preliminary results show that beat gesture apexes co-occur with pitch accented syllables only 55.4% of the time, a rate much lower than previously observed (See Figure 1).
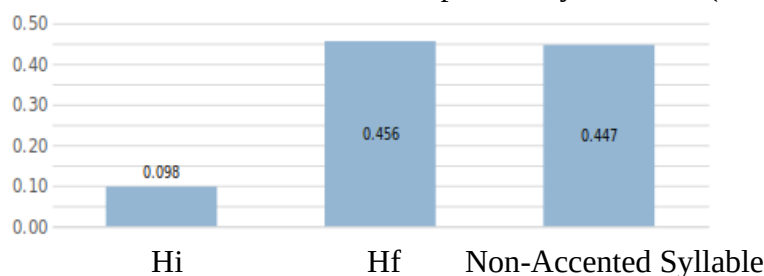

Figure 1: Frequency of beat gesture apexes by co-occurring prosodic phenomenon

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Closer analysis seems to suggest that those beat gestures that do not co-occur with stressed syllables may be serving a demarcative function for the left edge of the prosodic phrase, as their distribution across the phrase does not significantly differ from that of the initial accent (Figure 2). These early findings suggest that the co-occurrence of beat gestures and prosodic prominence may vary across languages and that these gestures may be related to other aspects of prosody -- not only in prominence, but in phrasing.
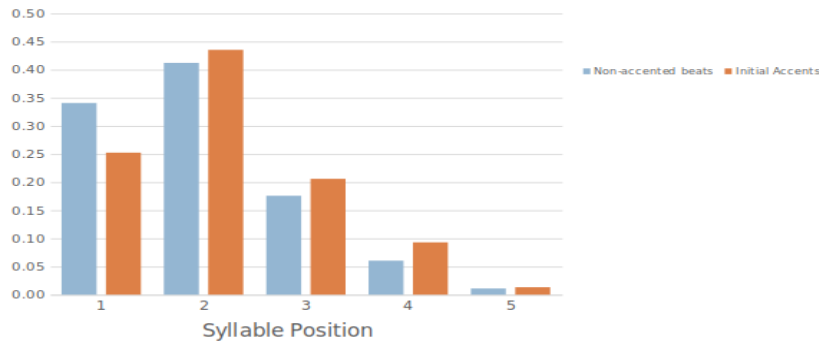

Figure 2: Frequency of "Non-accented" beat gesture apexes or Initial accents for each syllable position in the prosodic phrase

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