

Turning Points, Tonal Targets, and the English L- Phrase Accent

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How *f₀* contours align with words and segments is of great interest in current intonational phonology (e.g., D'Imperio 2007), inspiring numerous competing theories. For example, 't Hart and colleagues (1990) take *f₀* contour shapes as primitives, not closely aligned with segmental structure; for Ladd and colleagues, by contrast, tonal targets form the primitives of a system in which *f₀* turning points realizing them are tightly aligned with specific segmental landmarks. Such claims rely on observations of the relation between estimated *f₀* tracks and estimated segment/syllable boundaries that are often far from unambiguous; *f₀* curves are often irregular due to segmental effects, and segmental boundaries are often ambiguous due to articulatory overlap. We investigate here alignment of one oft-cited *f₀* turning point: the end of the sharp fall after H* in H*L-H% contours, creating a notable change in slope from steep to less steep, in the *f₀* fall. These "elbows" were located in two ways: hand-labelling, and semi-automatic placement using a line-fitting algorithm developed by Beckman and Welby. We chose this contour owing to conflicting prior reports of the behavior of phrase accents such as English L-: all agree that the domain of L- may sometimes stretch leftward from the phrase-boundary, often across numerous syllables. Researchers disagree, however, concerning the details: phrase accents have alternately been said to seek metrically-prominent syllables (Grice, et al. 2000), word boundaries (Pierrehumbert and Beckman 1988), or simply to obey a general leftward imperative (Gussenhoven 2000).

In order to assess the behavior of our L-, utterances (embedded in short dialogues) were elicited from 15 speakers of American English. Target phrases varied (minimally) in metrical structure and relative location of word boundary (examples below), yielding 5 target classes, 5 phrases each, with 4 repetitions, for a total of 100 utterances per speaker, or 1500 total. Critically, these stimuli provide long strings of syllables between the H* accent and the final syllable bearing H%, maximizing the potential for variability in the behavior of the *f₀* track under the influence of the L- target.

Automatic and by-hand determination of the end of the sharp fall, while highly mutually-consistent, nonetheless revealed no influence of word-boundaries or metrical prominences on the location of *f₀* elbows. While elbow placement fell in a relatively-consistent general region, it did not shift to increase proximity to any of the structural targets considered. Placement strategies involving fixed duration, as well as constant slope, proved likewise unsupported. Our results raise difficult questions concerning the representation of elbows in *f₀* falls (and rises). One interpretation is that *f₀* elbows, though attractive to the eye/algorithm, are nonetheless not tonal targets themselves, and thus not phonological elements demanding alignment with segmental structure (cf. Welby and Løevenbruck 2007). Instead, the speaker may follow a more general strategy of lowering *f₀* sharply in H*L-H% contours, to ensure that the bulk of the high *f₀* region co-occurs with the accented syllable. This would serve to distinguish this contour from a variety of other contours conveying very different meanings.

Phrase types (first word pitch-accented throughout):

1. minimum illuminator
2. minimum illumination
3. luminary nominator
4. luminary nomination
5. minimally maneuverable

Sample dialogue: A. The general says this new tank is minimally maneuverable.

B. Minimally maneuverable???!!! (H* L- H%) I thought it was maximally maneuverable!

Sample comparisons for elbow alignment and predictions given each hypothesis:

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|-------------------------------------|--------------------------------|--------------------------------|
| 1. Target: most prominent syll. | a. mínimum illúminàtor | b. mínimum illùminátion |
| | <i>earlier elbow predicted</i> | <i>later elbow predicted</i> |
| 2. Target: word boundary | a. mínimum illúminàtor | b. lúminàry nóminàtor |
| | <i>earlier elbow predicted</i> | <i>later elbow predicted</i> |
| 3. Target: leftmost prominent syll. | a. mínimum illúminàtor | b. lúminàry nóminàtor |
| | <i>later elbow predicted</i> | <i>earlier elbow predicted</i> |