

F0 declination in spontaneous Estonian: Implications for pitch-related preplanning in speech production



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Introduction

- **F0 declination** is the phenomenon whereby pitch gradually descends during an intonation phrase (IP) [1].
- It is modelled as **linear regression lines** fitted to F0 contours.
- **Preplanning of F0 declination** (or look-ahead) is evidenced in the relationship between utterance duration and declination slope, and utterance duration and the height of the initial F0 peak ([2]-[5]).
- F0 declination rate has also been shown to depend on utterance type (e.g. [6]), and speaking style (e.g. [7], [3]).

Method

- IP boundaries were automatically located (and manually checked) based on such boundary features: **pauses, segmental lengthening, creaky voice, and pitch reset**.
- The F0 contours were interpolated, stylised and converted to st.
- Three linear regression lines were fitted to the F0 contours: **top line, midline** and **baseline**.
- All three slopes were negative in **584 IPs** i.e. 62% of the transcribed data.
- The duration of the IPs ranged between 0.2 and 5.4 s (median 1.2 s).

Results

Declination slope

- The declination slope was less steep in longer IPs than in shorter ones.
- The three different slopes exhibited almost identical rates of declination: -4 st/sec (cf. for English [4]).

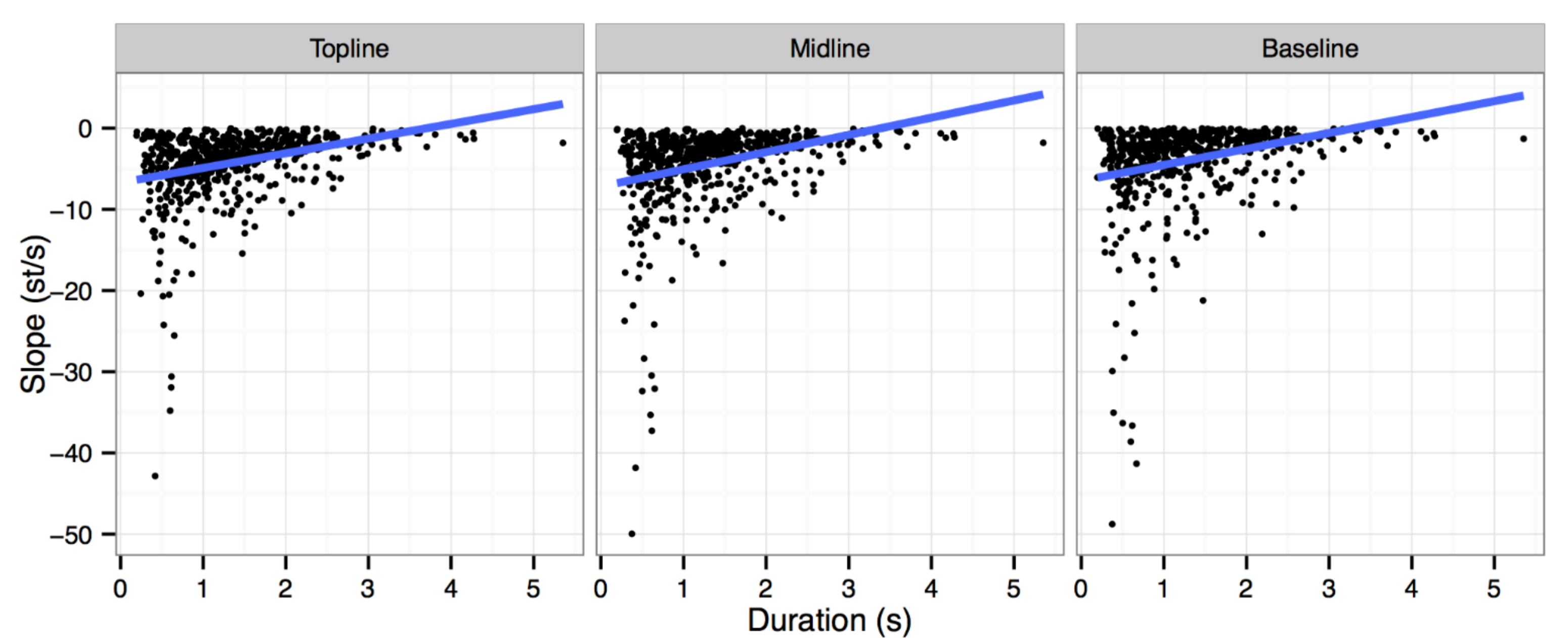


Figure 2. Top line, midline and baseline slopes (st/s) as a function of IP duration.

Conclusions

- Shallower declination slope and higher phrase-initial F0 in longer IPs
⇒ evidence for pitch-related preplanning in spontaneous Estonian.
- Higher phrase-final F0 in shorter utterances reflects the interactive character of spontaneous conversations, where the number of short IPs is much larger. Short IPs are more likely to be interrupted phrases, ending at a higher pitch within the speaker pitch range, whereas longer phrases, being more probably complete utterances, end at the speaker's low pitch.

Aims of the study

- to investigate the relationship of phrasal length with declination slope, and the phrase-initial and final F0 height in Estonian
- to shed more light on pitch-related preplanning in spontaneous speech

Data

- 5 dialogues from the Phonetic Corpus of Estonian Spontaneous Speech
- 5 female and 5 male speakers, average age 25, Standard Estonian

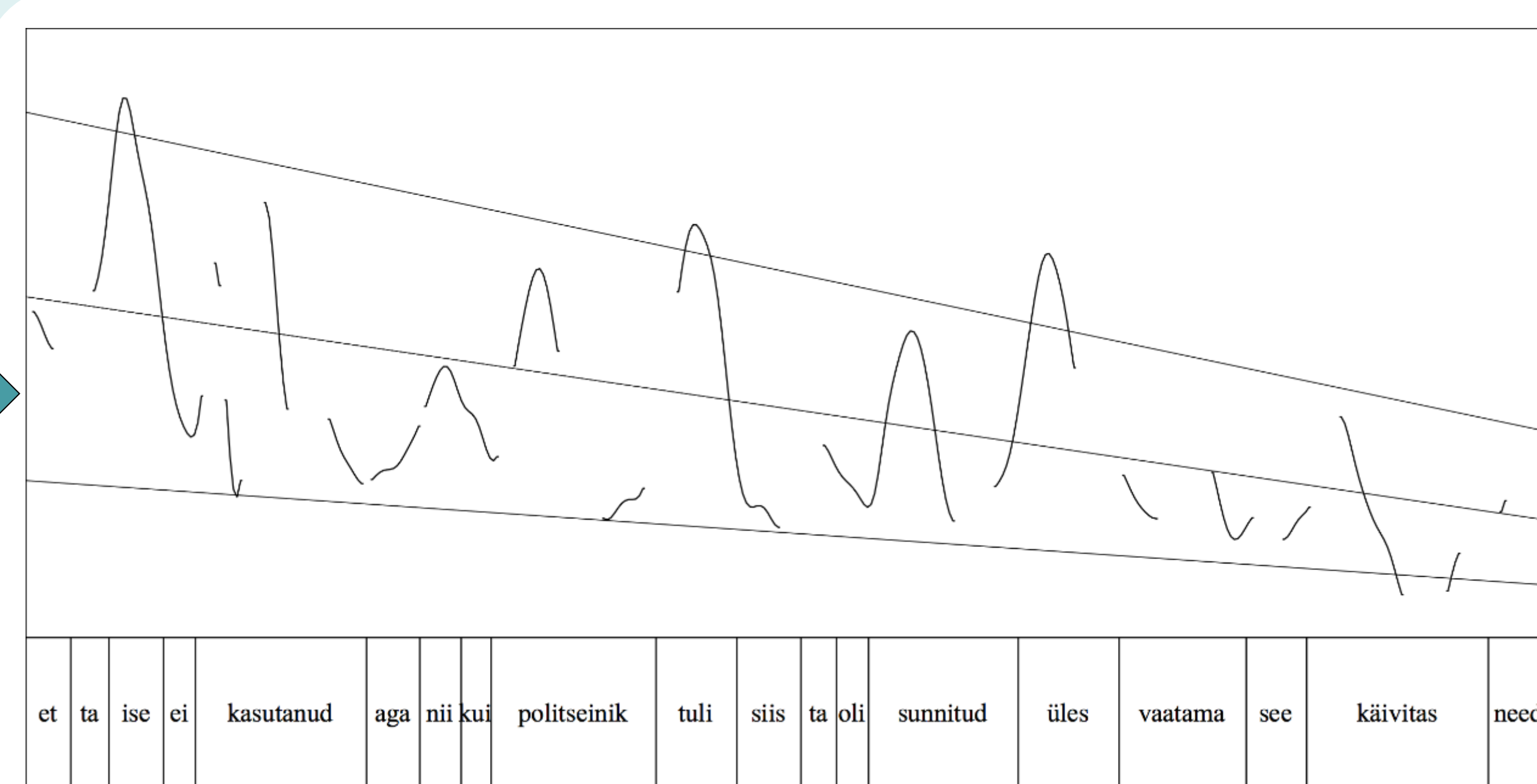


Figure 1. An example of a phrase with the three linear regression lines fitted to the F0 contour.

Phrase-initial and phrase-final F0 height

- The phrase-initial F0 height depends on phrasal length: longer IPs start at a higher pitch level than shorter ones.
- The phrase-final F0 height varies together with the phrasal length being lower in longer phrases than in shorter ones.

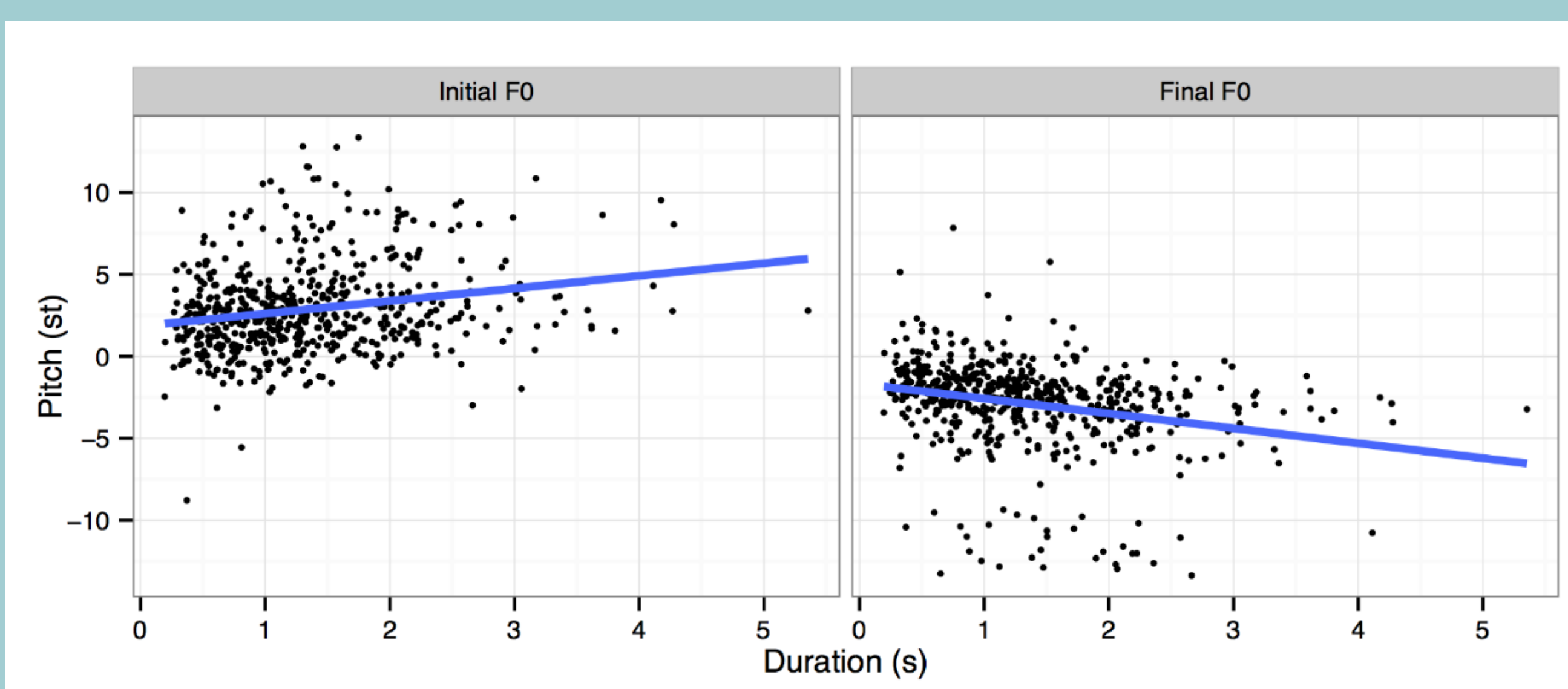


Figure 3. Phrase-initial and phrase-final F0 height (st) as a function of IP duration.

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