Competing syntactic and prosodic constraints in Hebrew prosodic phrasing

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This study brings empirical data from Hebrew to support the claim that prosodic phrasing is the result of an interaction of syntactic and prosodic constraints (Selkirk, 2000). With a few exceptions (e.g., Elordieta et al., 2003), little systematic experimental evidence has been brought to bear on Selkirk's important proposal. Earlier studies (notably Lehiste, 1973; Price et al., 1991) did document a correlation between syntactic structure and the perception of prosodic phrasing, but they did not study production, nor did they address interactions with other constraints on prosodic phrasing. Our study investigates prosody production in Hebrew and reveals constraints on prosodic phrasing that are strictly ranked: in Hebrew, the syntactic constraint $Align_R XP$ is ranked higher than the prosodic constraint $Bin(MaP)$.

The Hebrew Free State nominal is similar to the English complex nominal (e.g., *the coach of the wrestler*), which creates an ambiguity when followed by a relative clause (RC), as in (1). Such sentences have two possible syntactic analyses: the relative clause can be interpreted as attaching high, modifying the whole complex nominal (*coach of the wrestler* in (2)), or it may attach to the lower noun (*wrestler* in (3)).

(1)	ha-'ohadim	he'ericu	'et	ha-me'amen	šel	ha-mit'agref	še-paraš	(le'axar	ha-taxarut).
	the-fans	admired	ACC	the-coach	of	the-wrestler	who-retired	(after	the-fight).

(2)	[[det-N]	[V	ACC	[det-N_1	[P	[det-N_2	$]_{DP}]_{PP}$	[RC		$]_{RC}]_{DP}]_{VP}$]

(3)	[[det-N]	[V	ACC	[det-N_1	[P	[det-N_2		[RC		$]_{RC}]_{DP}]_{PP}]_{DP}]_{VP}$]

Twenty four native speakers of Hebrew from Tel Aviv University participated in the experiment. Sentences were contextually disambiguated using a variant of Bradley et al.'s (2003) 'Post to Times' protocol, in which subjects utter a target complex sentence formed from two unambiguous simple sentences presented visually. Eight basic items were manipulated for height of attachment (*high* or *low*) and for RC length (*short* =1 prosodic word or *long* =3 prosodic words; see (1) for length variants). All items had broad focus. Height of RC attachment was a between-subjects factor.

Two types of data analysis were performed: a ToBI-like coding by 2 trained judges, and an acoustic analysis. When subjects produced a sentence with an RC forced high, a prosodic break at the $]_{DP}]_{PP}$ brackets in (2) (in bold above) occured not only for a long RC (100%) as expected, but also for a short RC (92.8%), where the syntactic $Align_R XP$ constraint and the prosodic $Bin(MaP)$ constraint are in competition. For sentences with forced low RC attachment, the alignment constraint does not predict any prosodic break; this allows prosodic length constraints to come into play. Sentences with a long RC were phrased with a break before the RC 87.5% of the time, creating a balanced prosodic structure; for sentences with short relative clauses, several different phrasing patterns were observed: 40.6% Pre-N_2 break, 32.3% Pre-RC break and 27.1% Pre-N_1 break, with no statistical preference for one over the other. The acoustic analysis was in accord with these listening judgment findings. The results indicate clearly that the alignment constraint is ranked higher than the prosodic constraint in Hebrew.

This study was undertaken as part of a larger project evaluating the explanatory power of the Implicit Prosody Hypothesis (Fodor, 2002). The data on overt prosody in Hebrew (summarized in Shaked et al., 2004) support the proposal that implicit prosody influences the preferred interpretation of syntactically ambiguous sentences in silent reading: high attachment interpretations are more likely for long than for short relative clauses.

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