

MODERN HEBREW PREPOSITIONS ARE ENCLITICS: CONVERGING EVIDENCE FROM LEXICAL MORPHO- PHONOLOGY AND NATURAL SPEECH SEGMENTATION

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Abstract

Prepositions in Israeli Hebrew, as in other languages, are clitics. They are often regarded as proclitics, cliticizing to their object, probably because they both introduce this object (conceptually) and select for it (morpho-syntactically). In this paper, we make the opposite claim, namely that these prosodically-dependent items are in fact enclitic: they cliticize to the preceding word, mainly the sentence predicate. This claim is first supported by the analysis of evidence from natural speech prosodic segmentation. Then, it is shown that within the morpho-syntactic theory of Distributed Morphology, this segmentation is in fact predicted. The morpho-syntactic analysis is confirmed by its capacity to account for the distribution of non-radical [h] in the verbal system of Israeli Hebrew, hitherto considered an arbitrary trait. Finally, the analysis is shown to correctly predict the encliticization of definite articles preceding prepositions. Finally, the analysis is shown to correctly predict the encliticization of definite markers to a preceding preposition.

1 Introduction

This paper discusses the phonological attachment of the cliticized prepositions (*be-* ‘in’/‘at’, *ke-* ‘as’, *le-* ‘to’, *mi-* ‘from’) of Israeli Hebrew in natural speech. Although morphologically these items are grouped with the following constituent, we show evidence from naturally occurring speech that they are produced as if they were concatenated to the preceding prosodic unit. This can be explained by assuming a prosodic boundary between the preposition and its nominal complement, but not between the preposition and the constituent that precedes it. We then provide evidence from lexical morpho-phonology as to the

existence of this boundary. In the second part of the paper, we tackle the related problem of the morphological fusion of these prepositions and the definite article *ha-* ‘the’, creating the constructions such as *ba-* ‘in the’ and *la-* ‘to the’. These constructions demonstrate how the definite article cliticizes backwards, suggesting that there is no boundary separating it from the preceding word, and hence supporting our hypothesis. Evidence is also adduced of prosodic boundaries following these constructions. It is then claimed that the prosodic segmentation lends support to a specific view of morpho-syntax, namely Distributed Morphology (Halle & Marantz 1993), which places realizational boundaries between certain syntactic heads and their complements. It is shown that if the Determiner Phrase (DP) level, and no lower constituent, is taken to impose such a phrase boundary, then both the attested and unattested morphological and prosodic patterns can be motivated.

The paper thus puts forth evidence from two distinct, rarely combined linguistic domains: para-lexical prosody (also called “sentence phonology” by Kratzer and Selkirk (2007, 131)) and lexical morpho-phonology. Both domains exhibit the effects of a boundary between the preposition and its nominal complement; both place the same boundary between the ensemble preposition+definitie article and its complement; and in both domains such an ensemble may not be broken down. Even though the data in this paper comes exclusively from Israeli Hebrew, the situation described is similar in a great many languages; we thus hope that our claims are generalizeable beyond Israeli Hebrew.

The structure of the paper is as follows. In §2.1, we bring forward the *prosody first* approach, the theory of prosodic segmentation implemented in Silber-Varod (2013). §2.2 is dedicated to the presentation of Distributed Morphology (DM). The prepositions and their cliticization patterns are then presented in §3. In §4 we analyze the data according to DM. We then focus on the most challenging case of *le-* ‘to, towards, for’, which also serves as a prefix creating infinitives from verbal stems. We explain that our hypothesis does not fail in this case either. §5 presents the fused forms *la* ‘to the’ and *ba* ‘in the’ and their prosodic patterning, and discusses the theoretical import of the data. We conclude on §6.

2 Theoretical Background and Methodology

Speech sounds are of two levels: the segmental and the suprasegmental levels. The segmental level refers to phonemes, i.e. vowels and consonants, and their incorporation into words and utterances in a given language; suprasegmental sound patterns are “a vocal effect which extends over more than one sound segment in an utterance, such as a pitch, stress or juncture pattern” (Crystal 2008, 446). According to McQueen and Cutler (2010), listeners make use of suprasegmental patterns first and foremost to parse speech into words. The present study links word-level knowledge to the higher, para-lexical level of organization, i.e. the segmentation of speech into speech units on the intonation level.

Prosodic features can be detected primarily as the result of laryngeal or subglottal activity. Tone and intonation are controlled by laryngeal muscles and accentual features are attributed to the respiratory muscles. In contrast, segmental features are primarily associated with the supralaryngeal component (except the voiced-unvoiced feature) (Fox 2000, 4). Because the segmental and prosodic levels are distinct, prosodic patterns, like segmental phonological patterns, must be defined. This subsection thus describes the regularity with which prosody organizes structures that measure chunks of speech into countable units of various sizes (Fletcher 2010, 523).

During speech, speakers articulate a sequence of speech segments, organized (regrouped and delimited) via suprasegmental features, such as duration (and rhythm, in consequence), fundamental frequency (f0), and intensity. Pauses, which cannot be categorized as speech

sounds, also participate in prosodic organization, in that they too demarcate speech units (Cruttenden 1997, 30; Dankovičová et al. 2004, 18), by signaling the boundaries of Intonation Units (IU).

A predominant approach in the study of prosodic segmentation derives its regularities from syntactic structures. As Gussenhoven (2004) puts it: “After the syntactic structures that are needed to express a linguistic message have been assembled, words are selected to ‘fill’ them.... Prosodic constituents will be constructed on the basis [our emphasis] of the morpho-syntactic structure, including information structure, in simultaneous agreement with phonological conditions on size. [...] after the addition of any post-lexical tones, adjustments may be made, and the resulting surface representation is delivered to the phonetic implementation (Gussenhoven 2004, 143).

Selkirk (1995, 8) captures the relation between syntactic structure and prosodic structure by formulating constraints on the alignment of the two structures. Nevertheless, she notes that “the set of constraints governing the interface between morpho-syntactic and prosodic structures make no reference to functional categories at all. Rather, it is only lexical categories and their phrasal projections which would figure in the statement of morpho-syntactic constraints on prosodic structure” (ibid., 10). Indeed, “a small subset of English monosyllabic function words, the ones written as orthographic ‘contractions’ ... behave as if they are enclitic to the preceding word ... rather than proclitic to the lexeme in the following [phrase]. It is an interesting fact that these contracted forms are only possible if they are not phrase-final ..., atypical prosodic encliticization that they display must somehow reflect this fact. For now, this remains a puzzle” (ibid 1995, note 9).

Such monosyllabic function words exist in Hebrew too, and it is their cliticization that we intend to tackle in the present paper, through the prism of evidence from IH spontaneous speech that was segmented into IUs and then analyzed for its prosodic structures.

2.1 Prosodic Segmentation: Introducing the Continuous Elongation Boundary Tone

The findings of IH presented in this paper are taken from 19 audio segments from 19 different recordings that were selected from the Corpus of Spoken Israeli Hebrew (CoSIH).¹ The recordings, which were taken during 2001-2002, are of authentic Israeli Hebrew everyday conversations. Each dialogue consists of conversations between one core speaker and various interlocutors with whom the speaker interacted on that day. The research corpus consists of 31,760 word-tokens (over 6 hours of speech) of which 4,289 are word-types. 44% of the examined material is one-side telephone conversations; while 56% is face-to-face dialogues. The prosodic boundary tone inventory consists of 9,400 annotated boundary tones. The present research focuses on the 764 Continuous Elongation boundary tones that consist of 10.72% of all detected prosodic boundaries.

The prosodic perspective adopted in Silber-Varod (2013) strives to study the realization of prosodic boundaries of IUs thoroughly and independently of segmental and syntactic bias. It is therefore dubbed a “prosody-first approach”. An initial premise of this approach is that prosodic units are not necessarily parallel to syntactic structures, thus the method is not to define prosodic boundaries in relation to syntactic boundaries, but first to determine the units

¹ The observations in this paper were carried on spontaneous speech corpus – The Corpus of Spoken Israeli Hebrew (COSIH), which we assume contributes an added value to this research. Perceptual segmentation of IUs has already been implemented on CoSIH, by Izre'el (2005), Cohen (2004), Silber-Varod (2005; 2013), Gonen (2009), Dekel (2010), and Ozerov (2010). Samples of CoSIH segmentation into IUs are presented in the The Corpus of Spoken Israeli Hebrew (CoSIH) <<http://humanities.tau.ac.il/~cosih>>.

of prosodic intonation and their boundaries, and only then to analyze their location with respect to the syntactic environment. This method has been used before for transcribing spoken Israeli Hebrew (e.g., Izre'el 2005, 2010; Amir, Silber-Varod, and Izre'el 2004; Katzenberger and Cahana-Amitay 1999; Maschler 2007).

The annotation method was based upon the following premises:

- Prosody and syntax are two independent components of spoken language (Chafe 1994; Gussenhoven 2004; Anderson 2005; Wartenburger, Steinbrink, Telkemeyer, Friedrich, Friederici, and Obrig 2007).
- Prosody is the primary linguistic tool of speech segmentation.
- The intonative structure is prior in perception to the syntactic one (Lacheret-Dujour and Beaugendre 2002). This was concluded in language acquisition research that showed that prosodic cues play a pivotal role for infants in their rapid acquisition of language. Infants as young as six months old are sensitive to prosodic markers of syntactic units smaller than the clause and they use this sensitivity to recognize phrasal units, both noun and verb phrases, in fluent speech (Soderstrom, Seidel, Kemler-Nelson, & Jusczyk 2003; Anderson 2005; Wartenburger et al. 2007).

Continuous Elongation is unique in that it reflects the “hesitation” phenomenon that was studied before as a type of disfluency (akin to repetitions, false starts, etc.). Within the ToBI annotation system hesitations are part of break-indices marked as 3p, meaning “a disfluent break long enough for an intermediate phrase boundary” (Green 2010, 85).

In Silber-Varod (2013), the phenomenon of elongated hesitation was not treated as a type of speech disfluency but rather was set as a type of rhythmic pattern of speech, i.e., a significant boundary tone pattern. This view is compatible with Blanche-Benveniste's (2006) view, which claims that treating such phenomena as insignificant is “a linguistic mutilation”. (ibid, 61-62). In terms of prosodic cues, the most prominent prosodic feature of Continuous Elongation is its excessive duration (for an overall definition see Silber-Varod 2013: 55-66). As a result, a new definition of a well-known phenomenon of hesitation disfluency was set as a boundary tone for intonation unit in IH.

The Continuous Elongation was part of a prosodic annotation method taken in Silber-Varod (2013), that imposes two main types of Intonational Unit boundary tones that can be defined according to the communicative value of intonation: Terminal (T-) boundary tones and Continuous (C-) boundary tones. A boundary tone was annotated as Terminal when the surface intonation signaled that the speaker had “nothing more to say”. Terminal boundaries were evident, for example, in short feedback responses (such as [toda] ‘thanks’, [ken] ‘yes’) and wh-questions.

A boundary tone was annotated as Continuous whenever the final tone of the intonation unit signaled “more to come”. In this respect, the continuous boundaries function as intermediate phrases. The five C-boundary tones are: C→ (Continuous Neutral), C: (Continuous Elongation), C↑ (Continuous Rise), C↑↓ (Continuous Rise-Fall) and C↓ (Continuous Fall). Fragmented (--) boundaries were also used in the annotation process.

It should be stressed again that prosodic boundaries were annotated independently of the syntactic structure.

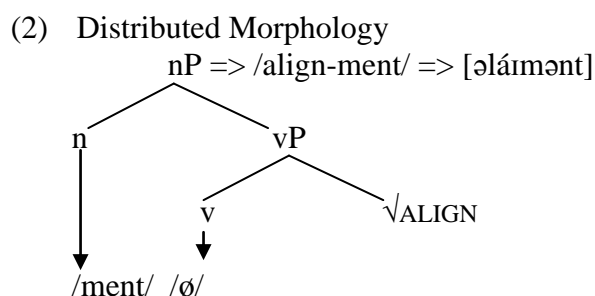
An example of the annotation system is demonstrated in (1). Each IU is transcribed on a separate numbered line which ends with the C-boundary label and the translation on the right side (the translation in this example reflects the word order of the original utterance). Pauses are marked with #.

- (1) An example of the annotation system of prosodic boundaries²
- | | |
|---------------------------------|---|
| 1. ha davar še C: # | ‘The thing that C: #’ |
| 2. haxi C: # | ‘most C: #’ |
| 3. keilu C: # | ‘like C: #’ |
| 4. a ha davar še C→ | ‘uh the thing that C→’ |
| 5. haxi madhim še kara li C→ # | ‘most amazing that happened to me C→ #’ |
| 6. ke C: # | ‘as C: #’ |
| 7. ke studentit C↑ | ‘as a student C↑’ |
| 8. haya še hirceti C: # | ‘was that I lectured C: #’ |
| 9. al e C: | ‘about uh C:’ |
| 10. mašehu me ha teza šeli C→ | ‘something from the thesis I wrote C→’ |
| 11. be f-- | ‘in f--’ |
| 12. be C: | ‘in C:’ |
| 13. forum le limudey naSim # | ‘a forum of Women studies #’ |

To conclude this introduction, we have presented the method that was applied to the data from natural IH speech with special focus on Continuous Elongation boundaries. The distribution of this boundary tone with respect to prepositions and its implications for the phonological behavior of prepositions will be the topic of this paper. The analysis will be conducted within the framework of Distributed Morphology, presented in the next subsection.

2.2 Distributed Morphology, Phases and the Separation of Affix and Category

The morphological analysis in this paper is conducted from within the theory of Distributed Morphology (DM, Halle & Marantz 1993). In this theory, lexical items have internal structures, which are constructed in the same module as sentences, namely Syntax. To illustrate, consider the typical structure of the English word alignment in (2). A verbalizing head *v* is merged with a root $\sqrt{\text{align}}$. This complex structure is then selected by a nominalizing head *n*. While the head *v* has a null realization, the head *n* (in this context) is assigned the underlying representation /ment/, and the result is then processed by the phonology to yield the complex form [əlálmənt].³



² The script of the examples in this paper does not correspond exactly to the IPA script. The differences are: <r> = voiced, (roughly) uvular fricative; <x> = uvular, (roughly) voiceless fricative; <c> = alveolar affricate; <ʃ> = palato-alveolar approximant; <y> = unrounded semi vowel.

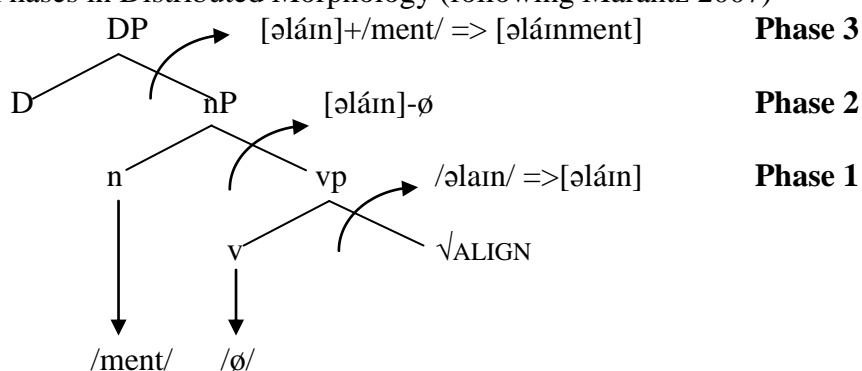
³ These morpho-syntactic heads are also called “little”-x (x=n,v,a etc.) in the literature, in order to distinguish them from the N,V,A of syntactic analyses.

At least since Lexical Phonology (Kiparsky 1982), affixes have commonly been treated as operating on different cycles, or stages, of a given derivation. Thus, the suffix *-ment* may be analyzed as attaching at Level 2, whereas a suffix *-ity* attaches closer to the root, on level 1. However, what defined these levels of derivation was the set of phenomena they were devised to explain: an admittedly circular reasoning. One of the advantages of building words as in (2) is that the stages of derivation may be demarcated with respect to the independently established syntactic structure.

In DM, in accordance with the terminology of the minimalist framework, these stages of derivation are called phases (following Chomsky 2001). At every phase, the syntactic structure is “spelled out”, i.e. matched with a phonological realization. This realization is “frozen” and becomes inalterable by the realizations of subsequent phases.⁴ The question remains open, however, which syntactic entities are phasal and which aren't.

To illustrate, Marantz (2007) claims that each category head *n*, *v*, *a*(djective) is a “phase-head”, i.e. marks a phase in the derivation. Thus, Marantz's derivation of *alignment* will proceed in three stages, as in (3). First, the form of the root $\sqrt{\text{ALIGN}}$ will be spelled out, because *v* is a phase-head (a phase head triggers the realization of its complement, see Scheer 2008). The second phase, triggered by *n*, will only add a $/\emptyset/$ to the string to be realized. It is only at a third, structurally superior phase that the realization of *n* will be considered. In other words, the base $/\text{ə}l\text{a}m/$ and the suffix belong to completely different phases: the prediction is made that suffixation of *-ment* cannot influence the form of its base.

(3) Phases in Distributed Morphology (following Marantz 2007)



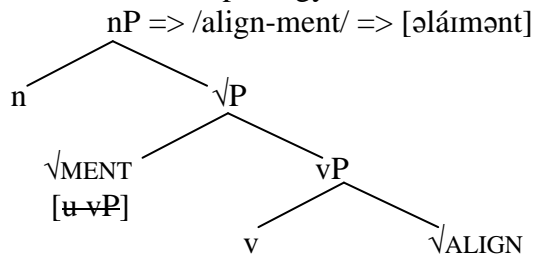
Whether “little” *n*, *v*, *a* etc. are phasal heads thus becomes an issue of empirical adequacy (Embick 2011 is an example of an attempt to tackle the problems that arise from this generalization). In Faust (2011), several arguments are provided against this hypothesis, and *D*, the head of the DP, is put forth as the first phasal head. This view will be adopted in the present paper. We will return to this point in section 4.

So far for Classic DM. In a recent development of the theory, Lowenstamm (2010) proposes to analyze suffixes such as *-ment* as equivalent to roots, with the difference that suffixes are “bound” roots. This characteristic is expressed by having such roots bear a selectional restriction in the form of a feature that must be checked against the structural complement of the root. Thus, in (4), the suffix *-ment* is represented as a root $\sqrt{\text{MENT}}$ carrying

⁴ Several authors (e.g., Embick 2011) have renounced this strong hypothesis, offering different attenuations as to the conditions under which phonological material is frozen. In this paper, the strongest hypothesis will be maintained: the phonological form of the items of one phase cannot be affected by the phonological form of subsequent phases. For the application of phase theory to prosodic data other than those described in the present paper, see Selkirk and Kratzer (2007) and subsequent work.

a feature [u vp].⁵ This root is bound in that it has to attach to a vP level. In (4), this requirement is fulfilled; the barred script represents this fulfillment.

(4) Distributed Morphology in Lowenstamm (2010)



As a summary of this subsection, we repeat the points that will be important for the ensuing analysis. According to DM, words are derived in the syntax, and syntactic heads define the stages of the derivation, which are called *phases*. Phasal heads match their complement with realized phonological strings which are unalterable by subsequent material. According to the version of DM adopted here:

- 1) The first phasal head is D in the nominal structure.
- 2) Affixes are represented as bound roots, i.e. roots with selectional restrictions.

Having discussed the theoretical framework of DM, we now turn to the phenomena of this paper, i.e. prepositions and their phonological and prosodic distribution in IH.

3 Prepositions in Israeli Hebrew

3.1 Prepositional Clitics in Israeli Hebrew Leaning Back and Forth

The two Hebrew prepositions with which this paper is concerned are *le* ‘to, towards’ and *be* ‘in, with’. Both are represented in Hebrew orthography as a single letter ל, [le] ‘to’ and ב [be] ‘in/at’. There is no orthographic space between these letters and their complement noun, which they always precede (<l-roma> [le-roma] ‘to Rome, <b-roma> [be-roma] ‘in Rome’). According to Rosén (1977, 69), one-consonant morphemes “have now to be phonemicized /be/ ‘in’, /le/ ‘to’”. Henceforth, when referring to their underlying form, we will use the forms *le* and *be*.

le, much like English *to*, is also used in the formation of all infinitives.⁶ Verbs in Israeli Hebrew belong to one of five verbal patterns (5). The infinitive is formed by attaching *le* to the beginning of what seems like the verbal stem; the form of infinitives may thus change depending on that of the verbs.

⁵ In this notation, <u> stands for “uninterpretable”, which means that the feature does not have any meaning or form of its own, but must be checked against the complement of the head that carries it.

⁶ This is very common in the languages of the world (Haspelmath, 1989).

(5) Past, future and infinitive stems of the verbal system (passive verbs aside)

<i>Type</i>	<i>Past</i>	<i>non-Past</i>			
		<i>Participle</i>	<i>Future</i>	<i>Infinitive</i>	
I	ragaš	rogeš	-rgoš	li-rgoš	‘be agitated’
II	rigeš	me-rageš	-rageš	le-rageš	‘excite, move’
III	hirgiš	m-argiš	-argiš	le- h argiš	‘feel (trns./intrns.)’
IV	ni-rgaš	ni-rgaš	(-irageš)	(le- h irageš)	‘be excited’ ⁷
V	hit -rageš	m-it-rageš	-it-rageš	le- hit -rageš	‘be/become excited’

Two facts must be pointed out in (5). First, infinitives of type I are formed with a prefix *li* rather than *le*. Historically, these two vowels were variants which alternated according to the syllabic structure of the resulting form. In Israeli Hebrew, a similar analysis is possible (see Faust 2011 for argumentation).

Second, and much more importantly for the present purpose, one remarks that the attachment of *le* has an intriguing effect on the verbal stem of types III-V: a segment [h] (in bold) surfaces between the two. In type III and V, an [h] also appears in the past form of the verbs; but no future or participle form bears it. We will return to this point in the analysis.⁸

Unlike English preposition, Hebrew *be-* and *le-* may not be stranded:

(6) No preposition stranding

- a. ha-yeled še- šarti lo / *le
 DEF-child that sing.1SG.PAST to.3SG/*to
 ‘the child I sang to’
- b. ha-bayit še- noam gar bo / *be
 DEF-house that Noam live.SG.MS in.3SG/*in
 ‘the house Noam lives in’

As regular clitics, *be* and *le* may not bear stress and must therefore join another phonological word. Both information structure (they precede the complement) and the facts from stranding would suggest that they are proclitics, i.e. clitics that attach to the following word. However, as we will now see, evidence from natural speech suggests that this is at least not the only option.

3.2 Prepositions in Natural Speech – Data and Findings: *le* and *be*

In Silber-Varod (2013) both *le* and *be* were tagged PREP (prepositions) and were thus considered as conducting similar behavior. It was found that in IH, the 5th most probable part-of-speech (POS) to be followed by a C-boundary is the preposition (PREP) (Table 1, line 5).

⁷ Only the participial form of this verb is in use, probably due to the similarity with Type V. The forms cited in parentheses are those that the verb would take if it were used in the future and infinitive.

⁸ In Israeli Hebrew, [h] is pronounced only rarely and in careful speech. This instability is irrelevant for our purpose. First, because it holds for all the [h] sounds in the language; second, because it contrasts with /ø/ (or /ʔ/): /harag/ ‘he killed’ can be pronounced either [arag] or [harag], but /ʔarag/ ‘he wove’ can only be pronounced [arag], never [harag], which would be a sign of foreign accent; and third, most importantly, because even when [h] is deleted, the syllable boundary is still well-felt in careful speech.

Table 1: Probabilities of the 5 most probable POS before C-boundary tone in spontaneous IH.

	<i>POS and following C-boundary</i>	<i>Occurrences</i>	<i>Probability</i>
1	POSS (possesive [Sel]) C:	22	0.957
2	DEF (definite article [ha]) C:	105	0.938
3	PREP-DEF (Preposition with definite article) C:	44	0.880
4	SUB (Subordinate particle [Se] 'that') C:	42	0.875
5	PREP (Preposition) C:	100	0.847

In (6) above it was shown that prepositions cannot stand at the end of a sentence. This is correct even when the preposition is followed by a Continuous Elongation boundary tone. It is thus always predicted that a NP is about to be uttered, as in (7)-(10). Examples(8) and (10) show repetitions in the environment of preposition and Continuous Elongation boundary tone. Repetitions of prepositions, just like the absence of repetition after a Continuous Elongation, may be regarded as disfluency. A unified account may nevertheless consider both cases to reflect the same systematic property, namely a potential break *after* prepositions.

- (7) *bxina be C: # historya* šel našim [C412]
 exam *in C: # history* of women
 'an exam on the history of women'
- (8) *meašer li-xjot be C: be hitnagšut kol ha zman* [C1111]
 than to-live *in C: in* conflict all the time
 'than living in conflict all the time'
- (9) *ze mea kilometer ze exad le C: elef* [OCh]
 this one-hundred kilometer this one *to C: one-thousand*
 'this is one hundred kilometers it is one to a thousand'
- (10) *ha davar še C→ haxi madhim še kara l-i C→ # ke C: # ke studentit C↑*
 the thing that C→ most amazing that happened to-me C→ # *as C: # as* a student C↑
 'the most amazing thing that happened to me as a student' [C412]

Whereas the "PREP C: N" sequence was found to be one of the five most probable sequences to be split by a C-boundary, **no C: boundary** was ever found between a *be-* or *le-* and the preceding nucleus which it attached to syntactically. It seems that, contrary to what IH orthography and syntax suggest, prepositions behave as enclitics.⁹ Indeed, *le* and *be* seem to encliticize to the preceding word, like the small subset of function words mentioned by Selkirk (1995, note 9).¹⁰ We will now see that this property correlates with the predictions of Morpho-syntactic theory.

⁹ Bolozky (2003: 124) brings evidence to the effect that prepositions are proclitics, i.e. belong to the following prosodic word. To prove this claim, he provides cases of phonological interactions between prepositions and their complement: *le+mesiba* = [lemsiba] 'to a party', with the initial [e] of the word *mesiba* dropped when the preposition is attached. However, such interactions also occur between a verb and its complement (*šone+mesibot* = [šonemsibot] 'hate parties'). The verb, of course, cannot be claimed to have proclitic status; hence, such phonological interactions do not necessarily point to a proclitic status.

¹⁰ Interestingly function words may appear without a complement in IH idioms, as in (i). **Error! Reference source not found.**

- (i) Idioms with prepositions in final position
- | | |
|---------------------------|----------------------------------|
| <i>paam be</i> | 'once in a while' (lit. once=in) |
| <i>halax im hiriš bli</i> | 'went with felt without' |
| <i>ze haya al-yad</i> | 'that was ' |
| <i>reva le</i> | 'quarter to' |

4 Problem and Analysis: Why the Enclitic Nature of *le* (and *be*) is Only Expected

As we saw in the preceding subsection, if the Continuous Elongation boundary is understood as grammatical, there is evidence from natural speech as to the enclitic nature of *le* and *be*. In this section, we will investigate what DM has to say about the distribution of Continuous Elongation boundaries. In the end of this section, it will become clear that the enclitic nature of *le* (and *be*) is not only predicted by the theory, but also constitutes the key to the understanding of the distribution of the consonant [h] throughout the verbal system.

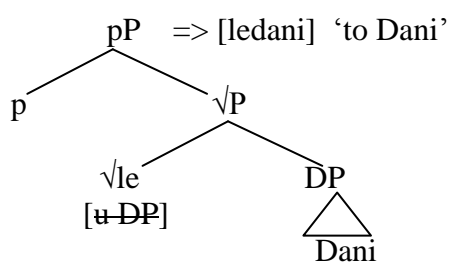
Let us recall the important points about the theory adopted here, mentioned in the introduction:

- (11) Theoretical points adopted
- a. Words are derived in the syntax.
 - b. Phasal heads match their complement with a realized phonological string.
 - c. These strings are unalterable by subsequent material.
 - d. The first phasal head is D.
 - e. Affixes are represented as bound roots, i.e. roots with selectional restrictions.

We have already equated the infinitival *le* with the preposition *le* (before (5) above). In what sense are the two *le* “the same”? The theory in Lowenstamm (2010) has a specific answer to this question, namely (11e) above: if the two markers are one and the same then they must carry the same selectional restriction, the same uninterpretable feature.

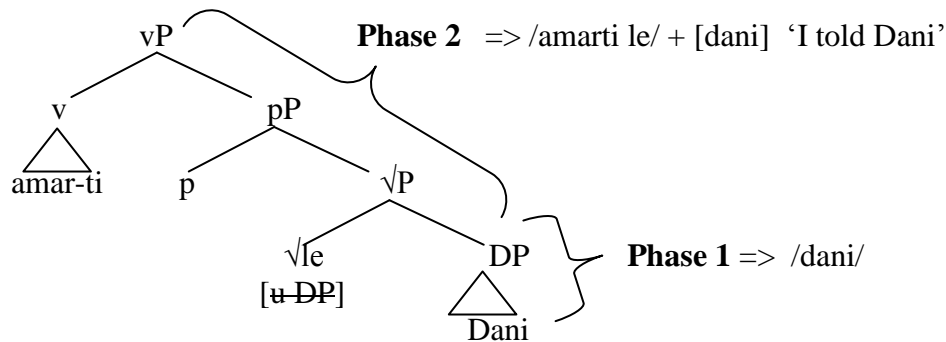
What would that selectional restriction be? In the case of the infinitives, as mentioned, the stem to which *le* attaches is never attested independently, thus not permitting a clear identification of the level instantiated. However, in the case of prepositions, there is no question: prepositional *le* selects for the DP level. This merger would thus be represented, adopting the proposals of Lowenstamm (2010), as in (12):

- (12) *le*- select for a DP



Now, assuming point d) above - namely that D is the first phasal head - there will always be a phase boundary between *le* and its complement. This is exactly where the Continuous Elongation boundary was found in connected speech. It is now only natural to equate phases and prosodic units: as presented in 0, the clitic *le* belongs to the phase or prosodic unit preceding it, and not to the prosodic unit following it, i.e. its complement.

(13) *le* is not in the same phase as its complement



This model straightforwardly predicts that Continuous Elongation boundaries will appear between *le* and its complement, but not between *le* and the preceding word. Indeed, as pointed out above, the latter was not found in the corpus.

The analysis in (12) and 0 makes a specific prediction with respect to infinitives: since the same particle *le* is involved in the formation of infinitives, the latter are bi-phasal entities, with a phase boundary separating *le* from its stem. And if they are bi-phasal entities, then Continuous Elongation boundaries should be found between infinitival *le* and its complement in natural speech. This is exactly what is found, as the following examples in (14) show:

(14) Infinitive prefixes, *le* 'to', preceding Continuous Elongation:

- a. at yodaat le- C: le-šapec oto kcat ve ze [D341]
 you.2FM know-FM.PTCP.SG.F to- C: to-renovate.INF it a little and that
 'you know how to renovate it a little etc.'
- b. holex li- C: krot [C714]
 going.PRES to- C: happen.INF
 'it is going to happen'
- c. ze mamaš F # yaxol la- C: le-halhiv otxa meod [P711]
 it really F # can to- C: to-excite.INF ACC.2SG.M very
 'it really can excite you very much'
- d. hu carix le- C: le-hoci xulcot C→ [P831]
 he need to- C: to-take.out.INF shirts C→
 'he needs to take out the shirts'
- e. ani holexet axšav le-C: sader [P831]
 I go.FM.PRES. now to C: tidy.up.INF
 'I am now going to tidy up.'
- f. ve holexet l- F # la-ll C: hašlim et kol šot ha šena C→ [D341]
 and go.FM.PRES. to- F# to C: compensate.INF ACC all hours the sleep C→
 'And I'm going to compensate for all the sleeping hours.'
- g. ve laš- la- C: asot rošem kaze [OCh]
 and @- to- C: make.INF impression such.MS
 'and to make such an impression'
- h. az hu nivxar me ha C: šlixim be kanada le C: le-yaceg
 so he be.chosen.SG.M.PAST from the C: diplomats in Canada to C: to-represent
 et ha C: [C612]

¹¹ The vowel [a] here is probably a false start of the first vowel of the infinitival base [hašlim].

ACC the C:

‘so he was chosen from among the diplomats in Canada to represent the-’

- i. meod mosif le C→ le-havin et ha geografya [C412]
 very contribute to C→ to-understand.inf ACC the geography
 ‘it contributes a lot to to understanding the geography’

If so, the predictions made by the equal treatment of prepositional and infinitival *le* are confirmed: the same type of effect is found in the two morphological constructions. This correct prediction also adduces validity to the proposal to characterize markers according to their selectional restrictions.

Further evidence for the bi-phasal status of infinitives is found in the realm of “lexical” morpho-phonology, as we will now see.

4.1 Cliticization and the Distribution of [h] in the Verbal System

In (15), we reproduce the table from (5). As already mentioned, [h] appears in the past forms of types III and IV, as well as between the *le* and its base, which we now know is a DP, in types III-IV. However, no [h] appears in the future or participle which, just like the infinitive, have a prefixed element (a personal pronoun or /m-/, respectively).

(15) Past, future and infinitive stems of the verbal system (passive verbs aside)

Type	Past	non-Past			
		Participle	Future	Infinitive	
I	ragaš	rogeš	-rgoš	li-rgoš	‘be agitated’
II	rigeš	m(e)-rageš	-rageš	l(e)-rageš	‘excite, move’
III	h irgiš	m-argiš	-argiš	le- h argiš	‘feel (trns./intrns.)’
IV	ni-rgaš	ni-rgaš	(-irageš)	(le- h irageš)	‘be excited’ ¹²
V	hit -rageš	m-it-rageš	-it-rageš	le- hit -rageš	‘be/become excited’

At first sight, the distribution of [h] thus seems idiosyncratic and somewhat arbitrary: this is why, in traditional grammars, type III has been called “hif’il” and it was proposed that an /h/ is deleted in the participle and future, but not in the infinitives. Thus, a participle form of type III, for example, would have the derivation in (16), whereas that of the infinitive would have the derivation in (16).

(16) Different derivations for participle and infinitive: lexical h-deletion

	a) participle	b) infinitive
input	hafrit	hafrit
morphology	m+hafrit	l+hafrit
h-deletion	mafrit	N/A
output	[mafrit]	[lehafrit]

The derivations in (16) beg the question of why there is no h-deletion in the formation of infinitives. No traditional analysis attempts to explain this a-symmetry.

¹² See footnote 3 above.

The bi-phasal analysis above, in contrast, naturally accounts for this a-symmetry. In this account, there is a phase boundary between *le* and its complement. Point c in (11) above states that there can be no influence across phases between phonological realizations: thus, if the verbal stem contains [h], then the addition of *le* will not be able to trigger its deletion, because \sqrt{le} selects for the phasal DP. However, the addition of *m-* or the future prefixes, which do not select for a DP like *le*, may cause deletion.

But there is a problem in this analysis, namely that it supposes a morphologically-conditioned rule. The sound [h] does not regularly delete after these prefixes; indeed, when the /h/ belongs to the root, it is not deleted, and an epenthetic [e] appears between the prefix and the stem, as in /m-hager/ ‘immigrate.pres’ => mehager, *mager. One would have to say that this h-deletion is specific to non-root elements. Morpheme-specific phonology is not impossible according to some, but should preferably be avoided by elegance. In fact, the analysis above also provides such an alternative.¹³

Notice that the past forms of types III and V in (15), which carry [h], would all otherwise be vowel-initial. It is thus possible to claim that the [h] is epenthetic. If this is the case, then its absence from the prefixed forms is predicted: no epenthesis is called for when there is a prefix (17). At the same time, the insertion of [h] in infinitives (17) is also expected because, as claimed above, there is a phase boundary between the base and the clitic *le*: the realization of the base cannot take into account the existence of the phonological material in subsequent phases.

(17) Different derivations for participle and infinitive: epenthetic h-insertion

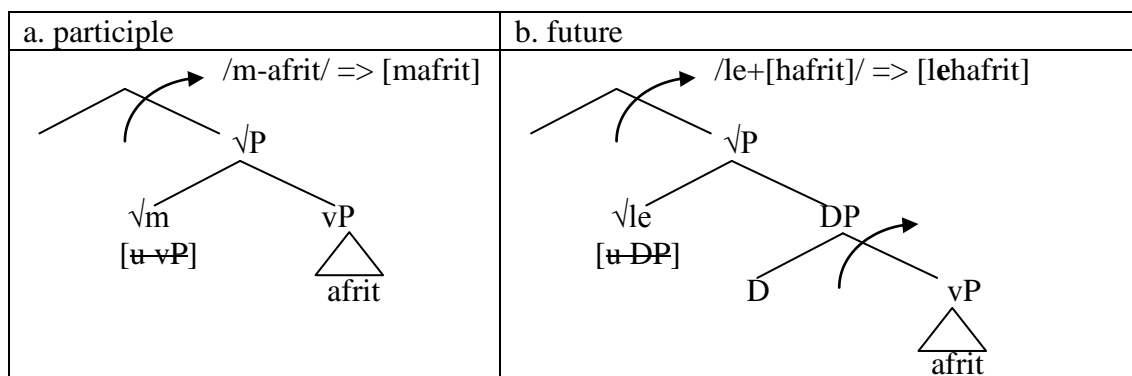
	a) past	b) participle	c) infinitive
input	ifrit	Afrit	afrit
morphology	∅	m+afrit	∅
epenthesis	hifrit	mafrit	hafrit
-----phase boundary-----			
morphology	∅	∅	le+[hafrit]
output	[hifrit]	[mafrit]	[lehafrit]

In both the past (17)a) and the infinitive (17)c), the stem lacks an onset when realization must occur, i.e. at the end of the first phase. The [h] inserted cannot be deleted subsequently, by the infinitival *le*. In the participle, on the other hand, the prefix is included in the first phase, and thus bleeds epenthesis.

The same difference is depicted in morpho-syntactic representations in (18). In (18)a), the complement of \sqrt{m} is a *vP*, not a phasal head. The prefix and the base are realized in the same phase and no h-insertion is called for. In contrast, the complement of \sqrt{le} in (18)b) is *DP*, whose head is phasal, and so the realization of \sqrt{le} may not influence that of the stem, which precedes it. Because that stem is vowel-initial, an [h] is inserted.

¹³ Another problem with this analysis is type VI infinitives, *lehirageš* in (15). In this case, an [h] appears in the infinitive that does not appear in the verbal conjugation. The infinitive clearly being a derived form, there is no base from which to derive that [h], so it is even more problematic to say that there is [h]-deletion... The alternative solution in the next paragraph, i.e. [h]-insertion, accurately predicts [h]-insertion in such infinitives.

(18) Syntactic structures of participle and infinitival forms



In the present analysis, if so, no morphologically-specific h-deletion is assumed. Instead, it is shown that the phasal make-up of the different forms predicts the insertion of epenthetic material exactly where one finds non-root [h] in the verbal system. This [h] is thus best explained as a phonological (epenthetic) insertion.

To summarize, this section began with the structural equation of prepositional and infinitival *le*. It was proposed that both select for a DP-level complement. This proposal was first confirmed by data from continuous speech, during which *le-* may cliticize to the preceding phonological word, leaving a possible Continuous Elongation boundary between itself and the following word. The same analysis was then shown to motivate the distribution of [h] in the verbal system. Additional proof for this claim comes from the interaction between prepositional *le-* and infinitival *le-*. Several semi-grammaticalized items in Israeli Hebrew require a preposition *le-*: *prat le* ‘except for’, *be-hašva’a le* ‘compared to’, *be-nigud le* ‘as opposed to’, and many others. These complex items have not only noun phrases, but also infinitives as their object. Interestingly, in these cases, there is no haplology: both the prepositional and the infinitival *le-*’s surface: *prat le-ledaber* ‘except for talking’, *behašva’a le-lekabel* ‘compared to receiving’, *benigud le-le’exol* ‘as opposed to eating’, etc. (all examples attested on the internet).¹⁴ Neither *le-* can be dropped: **behašva’a lekabel*, etc.

If we are right in claiming that prepositional and infinitival *le-*’s are the same morpheme with two only slightly different functions, then one would expect a haplology. The lack of haplology militates in favor of our theoretical claim that there is always a phase boundary between *le-* and its complement: if the two *le-*’s are in different phases, then the realization or presence of one cannot affect the realization of the other (see Nevins 2011 for a discussion of the interaction of haplology and realization).

A final remark is due: at no point was there any axiomatic use of the terms “prefix” and “clitic”. Thus, *le* was not assumed to attach to DP’s “because it is a clitic”. Instead, a structural definition (selecting a Phase head or not) was provided for the clitic/prefix distinction.

In the next section, we extend the analysis to the domain of fused realizations of preposition+definite article, which as it turns out constitute an apparent counter-example to our analysis.

¹⁴ Some of these examples were provided by Noam Ordan, Department of Computer Science, University of Haifa.

5 Extending the Problem to Fused Forms of Prepositions

We will now survey the two synthetic forms of prepositions with the definite article [ha] ‘the’, and their interaction with the prosodic boundaries. In Israeli Hebrew, the vowel that follows the consonant of the preposition is influenced by the presence of a definite article /ha/ ‘the’. /ha/ contracts with the preposition through elision, so that [la] ‘in the’ is a preposition /le/ followed by the definite article /ha/ ‘the’ (Rosén 1977, 163). For example, /le-ha-bayit/ is realized [la-bayit] ‘to the house’. The same is reflected in the fused form of [ba] ‘in the’, underlyingly /be-ha/. A third fused realization will be treated in this section: the ‘Accusative marker’ /et/, when followed by a definite article, also exhibits a fused realization: /et-ha/ is realized [ta] ‘Acc. the’, as in Figure 1 below.

These cases indicate that the definite article [ha] is enclitic on /be/ ‘in’, /le/ ‘to’, and /et/ ‘Accusative marker’. In order to investigate their distribution in IH, with respect to prosodic Continuous Elongation boundaries, Silber-Varod (2013) investigated all sequences of function words preceding the definite article in the corpus. The results of this investigation are presented in 3.1 below. In 3.2 we discuss these fused realizations from the perspective of lexical phonology. We show that despite initial appearances, such realizations confirm the parallelism between phase structure and prosodic segmentation.

5.1 Evidence from Natural Speech

There were 128 [la] ‘to the’ and 363 [ba] ‘in the’ in the corpus, as in (19)-(22). *la-* and *ba-* are encliticized with a following C-boundary 16 times and 36 times, respectively (which is 10%-12% of their occurrences in over 6 hours of speech). No analytic [le ha] or [be ha] were found, with or without C-boundary in between.

- (19) telex l-a C: # noyrolog ? # [P7]
 2SG.M-FUT.go to-the C: # neurologist ? #
 ‘Will you go to the neurologist?’
- (20) axšav kibalnu tša meot esrim šekel l-a C: rexev C↑ # test C↑ [D341]
 just receive.PST-1PL nine hundred twenty NIS to-the C: car C↑ # test C↑
 ‘we just received 920 NIS (bill) for the car test’
- (21) ani hayiti šam b-a C: # ba atikot C↑ # [C6]
 I be.PST-1SG there in-the C: # in-the antiquities C↑
 ‘I was there in the antiquities’
- (22) hem nifgešu b-a C: b-a seret nurit [C6]
 they meet.PST.3PL.M in-the C: in-the movie Nurit
 ‘They met during the filming of Nurit’

Indeed, even with prepositions that do not have fused realization with the definite article, such as /al ha/ ‘on the’, not one case was found with a C-boundary between the preposition and the article (23)-(24).

- (23) od lo siparta al ha C: tiyul be susim C→ [OCh]
 still not tell.PST-2SG about the C: trek in horses C→
 ‘You did not told yet about the horse trek’

- (24) az hu nivxar me ha C: šlixim be kanada [C16]
 so he be.chosen.SG.M.PAST from the C: diplomats in Canada
 ‘so he was chosen from among the diplomats in Canada’

In 252 cases, [ha] ‘the’ is preceded by [et] ‘Acc.’. The /et ha/ ‘Acc. the’ sequence has one of the ten highest probabilities ($p=0.52$) in the corpus. Like prepositions, in spontaneous Israeli Hebrew [et] and [ha] usually have a fused realization [ta] ‘Acc. the’,¹⁵ as shown in Figure 1 (the highlighted chunk demonstrates this phenomenon). Again, no evidence of a C-boundary between the accusative marker and the definite article was found.

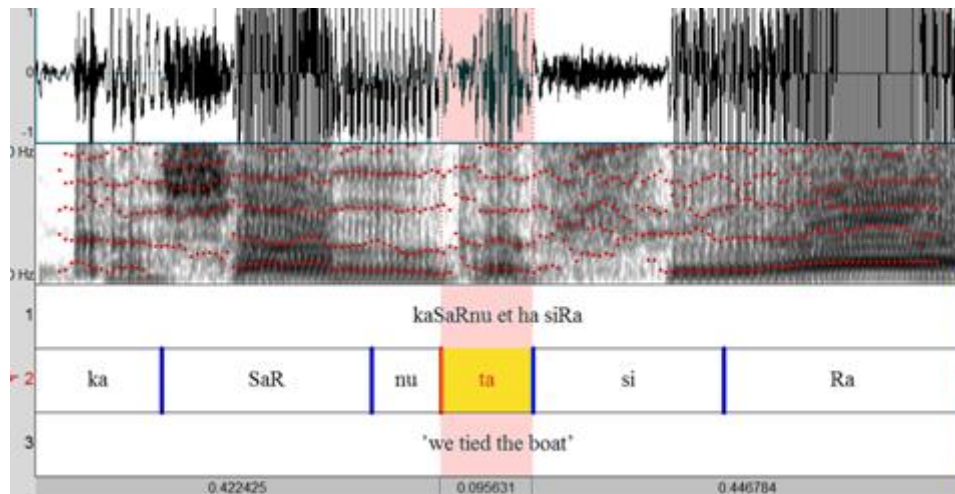


Figure 1: The phonetic realization of /et ha/ ‘Acc. the’ as [ta] (from OCh)

A representative example is shown in (25).

- (25) ani yexola lehavin et ha C: # et ha C: # tiskul # [C412]
 I can to understand ACC the C: # ACC the C: # frustration#
 ‘I can understand the the frustration’

As mentioned above, not one case was found where *ha-* is separated from the preceding preposition or accusative marker by a prosodic boundary. We conclude that *ha* is an enclitic.¹⁶

5.2 The Apparent Problematicity of Fused Preposition+Definite Article

The fused realizations of preposition+definite article of IH, not a typological oddity, pose two challenges to the morpho-syntactic account in 2.1. First, the definite article is structurally situated between the preposition and its complement (26)(26a), and yet, unlike the verbal bases discussed in 2.1 (26b), in natural speech the definite article often encliticizes to the preposition.

¹⁵ This phonetic representation was not included in the transcriptions of the research. Rather, this sequence was transcribed [et ha], to preserve the similarity to the orthography of the language where [et] is separated from the following word.

¹⁶ It is important to note that cases where no boundary exists between *ha* and the following word do not prove that [ha] procliticizes rather than encliticizes: Continuous Elongation boundaries are by definition not obligatory, so their absence does not indicate the absence of a morphological boundary.

(26) PREP+DEF VS. PREP+verbal stem (INF)

- a. PREP+DEF: la C: gan ‘to the C: garden’ **but not** le C: ha-gan ‘to C: the-garden’
- b. PREP+INF: le C: hatxil ‘to C: begin’

Second, the realization of the definite article, when not preceded by a preposition, is [ha]. When it **is** preceded by a preposition, the [h] drops: this is the reverse effect of what happened in the verbal system, where *l-* was **incapable** of making the initial [h] of its complement disappear. The two challenges can be stated in question form:

Q1: Why may the definite article encliticize if it is in the complement of the preposition?

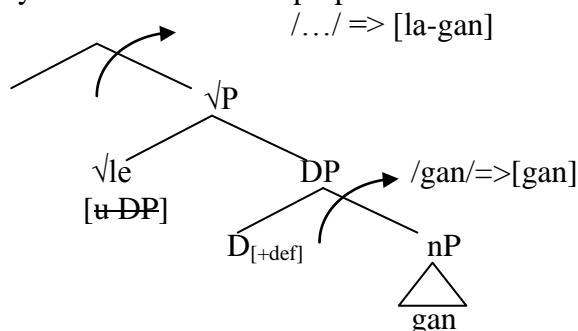
Q2: Why is the consonant [h] of the article deleted when preceded by *le-/be-*, unlike that of the verb?

Both these questions can be answered in a relatively simple manner, relying on the theoretical point (11) above, viz.

(11) b. Phrasal heads match their **complement** with realized phonological strings.

Consider the structure of a form like *l-a-gan* ‘to-the-garden’, presented in (26). The head D carries a [+definite] feature. It is a phrasal head, and so the form of **its complement** will be processed and frozen for further treatment. But the realization of the D head, whatever it is, will belong to the **next** phase. Again, like in the case of the preposition, the pause is predicted to occur between the article and the noun, as we saw it does. This analysis answers **Q1** above: the definite article encliticizes because it belongs to a different phase than its complement.

(27) Syntactic structures of preposition+definite article



Now let us turn to **Q2**. According to the representation in (27), \sqrt{le} and D are in the same phase. This means that they will be realized at the same stage in the derivation, and thus may influence each other's form. Indeed, one may simply state the following: “in the environment of \sqrt{le} and \sqrt{be} , D[+def] is matched with the form /a/; elsewhere, it is matched with /ha/”. Presumably, phonology will assimilate the vowel of the prefix and this [a]: /le+a/ = [la]. In the case of infinitives, this was not possible because of the phase boundary between the preposition and its complement. In other words: in the case of infinitives, the **theory** excluded interaction between *le-* and its base, because the latter was not D but a vP embedded in D; in the case of preposition+definite article, the theory does not exclude the influence of one on the other. The /h/ of /ha/ then, unlike the [h] of the verbal stem, may very well be subject to allomorphic rules in this configuration. There is therefore no contradiction between the fusion of *le-* and *ha-* and the analysis of infinitives.

This analysis of the fused *la-* and *ba-*, like the initial analysis proposed for infinitives, is slightly problematic because it is morpheme-specific. Only the /h/ of /ha/ will delete after *l-* and *b-*. However, here, too, it is possible to develop an alternative analysis. Let us assume that the underlying representation of the definite article were not /ha/, its citation form out of context, but rather /a/. Again, phonology will reduce /lea/ to /l+a/; just like the sequence /m+argiš/ in the participle form of the verb, would be expected to yield [la] (26)a. But if no such preceding particle appears, an epenthetic [h] would be predicted:

(28) A definite article /a/: derivations with and without preposition *le-*.

	a) with preposition	b) without preposition
input	le+DEF+gan	DEF+gan
morphology	le+a+gan	a+gan
V-assimilation	la+gan	N/A
epenthesis	N/A	hagan
output	[lagan]	[hagan]

No morphological machinery is called for in the analysis in (28). The sound [h] is predicted to be inserted before the [a] of the definite article for exactly the same reason as in the creation of verbal stems and infinitives. If the analysis in (28) is adopted, then the morpho-syntactic analysis is not only compatible with the fused realization – it actually predicts it.

Both analyses are available for the fused form of accusative *et* and the definite marker. Mutually-sensitive allomorphy could yield [ta] from /et ha/ by syncope of the first vowel and dropping the [h]. If the view in (28) is adopted, and [ha] taken to be underlyingly /a/, then the onset provided by [et] correctly precludes [h]-epenthesis, and [eta] is only expected. Allomorphy in this case only applies to the syncope of the first vowel [e]; but even that allomorphy can be regarded as simple phonology, since syncope of [e] in unstressed open syllable is very common in MH, especially in natural speech (Boložky 1999).

To summarize, this subsection discussed the compatibility of the analysis of the distribution of [h] in verbal morphemes with the existence of fused expressions of prepositions (/accusative marker) and the following definite article. It was shown that such fused expression do not pose a challenge to the version of derivation-by-phase presented for the verbal system: in fact, if derivation-by-phase can be used to predict the distribution of fused realizations, it would predict one in such a position. Furthermore, it was proposed that at least according to one view of the definite article, no special morphological apparatus is needed in order to derive the fused realizations: they can be accounted for by appealing only to phonological processes.

6 Conclusion

The prosodic alignment of function words, as stated by Selkirk (1995, note 9), is not straightforward issue. In this paper, we attempted to account for this challenging issue by examining data from Israeli Hebrew. We treated the cliticization of 1) the prepositions *le* and *be*; 2) the accusative marker *et*; and 3) the definite article *ha*.

A-priori, judging by semantic, syntactic and selectional (and orthographic) behavior, the items under discussion are proclitics. Instead, evidence was provided in favor of the opposite claim that these items are enclitics, not proclitics. Indeed, they “lean” backwards to the

preceding word, when they have a word to lean on.¹⁷ This conclusion was first based on the findings from the prosodic segmentation of natural speech: it was found that Continuous Elongation boundaries, i.e. significant boundaries signaling “more to come”, appear systematically 1) after a preposition; or 2) after a preposition+definite article complex. Crucially, such boundaries were found never to appear between the preposition and the preceding word or between the preposition and the article.

As a parallel move, it was shown that the appearance of Continuous Elongation boundaries in these exact positions is predicted by the morpho-syntactic theory of Distributed morphology. This claim holds if 1) Continuous Elongation boundaries appear between phases; 2) phase heads match their complement with phonological form, which is then “frozen”; and 3) D is a phase-head. These independently-motivated assumptions were shown to account not only for the placement of Continuous Elongation boundaries, but also for the distribution of non-radical [h] in the verbal system. It was further shown that the fused realizations of prepositions+definite article – *ba* ‘in the’ and *la* ‘to the’ and *ta* ‘Acc. the’ – are only expected given the assumptions above.

Anderson (2005) states: “the choice of proclitics or enclitics attachment can be made to follow from a more general principle of a language’s prosodic organization” (2005, 63). Putting forth evidence from two distinct, rarely combined, linguistic domains – para-lexical prosody and lexical morpho-phonology – we have shown that at least in the cases at hand no reference to prosodic organization has to be made. The prosodic segmentation follows from the morpho-syntactic structure. In addition, the convergence of prosodic and morpho-syntactic evidence signals the importance of the former: if Continuous Elongation boundaries indeed reflect morpho-syntactic structure, it follows that these boundaries are indeed significant, rather than performance phenomena of “disfluency”. That the two domains correlate and converge is thus certainly a welcome result.

References

- Amir, Noam, Vered Silber-Varod, and Shlomo Izre’el. 2004. Characteristics of intonation unit boundaries in spontaneous spoken Hebrew: Perception and acoustic correlates. In *Speech prosody 2004*, ed. B. Bel and I. Marlien, 677–680. Nara, Japan: SProSIG,.
- Anderson, S. R. 2005. *Aspects of the theory of clitics*. Oxford: Oxford University Press.
- Blanche-Benveniste, Claire. 2006. Linguistic analysis of spoken language: The case of French language. In *Spoken language corpus and linguistic informatics: Contributions of linguistics, applied linguistics, computer sciences*, ed. Y. Kawaguchi, S. Zaima and T. Takagaki, 35–66. Amsterdam: Benjamins.
- Bolozky, Shmuel. 1999. On the special status of the vowels *a* and *e* in Israeli Hebrew. *Hebrew Studies* 40:233–250.
- Bolozky, Shmuel. 2003. Phonological and morphological variation in spoken Hebrew. In *Corpus linguistics and Modern Hebrew: Towards the compilation of the corpus of spoken Israeli Hebrew*. *CoSIH*, ed. B. H. Hary, 119–156. Tel Aviv: Tel Aviv University, The Chaim Rosenberg School of Jewish Studies.

¹⁷ The question is raised regarding the status of enclitics in phrase-initial position: in the absence of a phonological word to their left, what do such words lean on? Two answers are possible: one is to say that in this case, they become proclitics. The other is to attribute them to some “degenerate” structure, akin to degenerate feet in metrical theory. If one chooses, as we do in this paper, to adopt the structures of DM in accounting for the segmentation of natural speech, the second conclusion is inescapable. The absence of a preceding word cannot change the fact that the clitic is realized in a different phonological word than its syntactic word. Additional readjustment of prosodic structure may nevertheless be possible.

- Chafe, Wallace. 1994. *Discourse, consciousness, and time: The flow and displacement of conscious experience in speaking and writing*. Chicago: University of Chicago Press.
- Chomsky, Noam. 2001. Derivation by Phase. In *Ken Hale: A Life in Language*, ed. Michael Kenstowicz, 1–52. Cambridge: MIT Press.
- Cohen, Smadar. 2004. “*Veshe’eno yode’a lish’ol - ma u omer?*” *Ways of asking questions in spontaneous spoken Hebrew*. MA thesis, Tel Aviv University. In Hebrew with English abstract.
- COSIH, The Corpus of Spoken Israeli Hebrew. CoSIH. <http://humanities.tau.ac.il/~cosih/english/index.html>
- Cruttenden, Allan. 1997. *Intonation*. Cambridge: Cambridge University Press.
- Crystal, David. 2008. *A dictionary of linguistics and phonetics*. Oxford: Blackwell.
- Dankovičová, J., K. Pigott, B. Wells, and S. Peppe. 2004. Temporal markers of prosodic boundaries in children’s speech production. *Journal of the International Phonetic Association* 34:17–36.
- Dekel, Nurit. 2010. *A matter of time: Tense, mood and aspect in spontaneous spoken Israeli Hebrew*, LOT Dissertation Series 251, Utrecht: The University of Amsterdam.
- Embick, David. 2011. *Localism versus globalism in morphology and phonology*. Cambridge, Massachusetts: MIT Press.
- Faust, Noam. 2011. *Forme et fonction dans la morphologie nominale de l’hébreu moderne*. PhD dissertation, Université Paris VII.
- Haspelmath, Martin. 1989. From purposive to infinitive – a universal path of grammaticization. *Folia Linguistica Historica* 10:287–310.
- Fletcher, Janet. 2010. The prosody of speech: Timing and rhythm. In *The Handbook of Phonetic Sciences, Second Edition*, ed. Hardcastle, Laver & Gibbon, 521–602.
- Fox, Anthony. 2000. *Prosodic features and prosodic structure: The phonology of suprasegmentals*. New York: Oxford University Press.
- Gonen, Ilan. 2009. *Morphophonology of the verbal root in spoken Israeli Hebrew*. MA thesis, Tel Aviv University. In Hebrew, with English abstract.
- Green, Hila C. 2010. *Prosodic features in the spoken language of children with autism spectrum disorders high functioning. ASD-HF. according to the theory of “Phonology as human behavior”*. PhD dissertation, Ben-Gurion University of the Negev, Beer Sheva.
- Gussenhoven, Carlos. 2004. *The phonology of tone and intonation*. Cambridge: Cambridge University Press.
- Halle, Morris & Alec Marantz. 1993. Distributed morphology and the pieces of inflection. In *The View from Building 20*, ed. K. Hale & S. J. Keyser, 111–176. Cambridge: MIT Press.
- Hardcastle, W. J., J. Laver & F. E. Gibbon. eds. 2010. *The handbook of phonetic sciences*. 2nd ed. West Sussex: Wiley-Blackwell.
- Izre’el, Shlomo. 2010. The basic unit of language: A view from spoken Israeli Hebrew. In *Proceedings of the international workshop on Afroasiatic languages*, 55–89. Japan: Tsukuba University.
- Izre’el, Shlomo. 2005. Intonation units and the structure of spontaneous spoken language: A view from Hebrew. Paper presented at the *IDP05 – International Symposium on “Towards modeling the relations between prosody and spontaneous spoken discourse”*, at Aix-en-Provence, France.
- Katzenberger, E. Irit, and Dalia Cahana-Amitay. 1999. Intonation units as processing units in spoken discourse. In *Developing literacy across genres, modalities, and language*, ed. A. Aisenman, 199–207. Tel Aviv: Tel Aviv University Press.
- Kiparsky, Paul. 1982. From cyclic phonology to lexical phonology. In *The Structure of Phonological Representations*, ed. H. Van der Hulst & N. Smith, 131–175. Dordrecht: Foris.

- Kratzer, Angelika & Elisabeth Selkirk. 2007. Phase theory and prosodic spellout: The case of verbs. *The Linguistic Review* 24:93–135.
- Lacheret-Dujour, Anne, and Frédéric. Beaugendre. 2002. *La prosodie du français*. Paris: éditions du CNRS.
- Lowenstamm, Jean. 2010. *Derivational affixes as roots. Phasal spellout meets English stress shift*. Unpublished manuscript, LLF. Available at <http://www.llf.cnrs.fr/Gens/Lowenstamm/arfloha.pdf>.
- Marantz, Alec. 2007. Phases and words. In *Phases in the theory of grammar*, ed. Sook-hee Choe, 196–226. Seoul: Dong-in.
- Maschler, Yael. 2007. On the mutual dependence of grammar and interaction: Self-repair in spoken Israeli discourse. Paper presented at the *Sixth Oranim conference*, February 5. In Hebrew.
- McQueen, J. M., & A. Cutler. 2010. Cognitive process in speech perception. In *The handbook of phonetic sciences*, ed. Hardcastle, Laver & Gibbon, 489–520. West Sussex: Wiley-Blackwell.
- Nevins, Andrew. 2011. Hapological Dissimination at Distinct Stages of Exponence. In *The Morphology and Phonology of Exponence*, ed. J. Trommer. Oxford: Oxford University Press.
- Ozerov, Pavel. 2010. *Accent and information structure in spontaneous Modern Hebrew conversation*. MA thesis, Tel Aviv University. in Hebrew, with English abstract.
- Scheer, Tobias. 2008. Spell out your Sister!. In *Proceedings of the 27th West Coast Conference on Formal Linguistics*, ed. N. Abner & J. Bishop, 379–387. Somerville: Cascadilla.
- Rosén, Haim B. 1977. *Contemporary Hebrew*. The Hague: Mouton.
- Selkirk, Elisabeth. 1995. *The prosodic structure of function words*. Available at <http://people.umass.edu/selkirk/pdf/PSFWUMOP%27%20copy.pdf>.
- Silber-Varod, Vered. 2013. *The SpeeCHain Perspective: Form and Function of Prosodic Boundary Tones in Spontaneous Spoken Hebrew*. Lambert Academic Publishing.
- Soderstrom, Melanie, Amanda Seidel, Deborah G. Kemler-Nelson, & Peter W. Jusczyk. 2003. The prosodic bootstrapping of phrases: Evidence from prelinguistic infants. *Journal of Memory and Language* 49:249–267.
- Wartenburger, Isabell, Jens Steinbrink, Silke Telkemeyer, Manuela. Friedrich, Angela D. Friederici, and Hellmuth Obrig. 2007. The processing of prosody: Evidence of interhemispheric specialization at the age of four. *NeuroImage* 34:416–425.

