A matter of time: tense, mood and aspect in spontaneous Spoken Israeli Hebrew

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2. Research plan and methodology

The design of the research plan and methodology were based on a pilot study, which was carried out on a sample of 22 Israeli Hebrew speakers, out of which 4 were non-native from different origins, living in Israel for at least 5 years (See Dekel 2009a). However, the current research was performed on Israeli Hebrew\(^1\) native speakers exclusively.

For a schematic description of the research plan see Figure 2-2 in section 2.4. A description of the planning and performance of the research is presented below.

2.1. Corpus

A corpus of approximately 44,000 words was established for this study, out of which at least one half was uttered by the informants. The rest of the words in the corpus were uttered by people surrounding the informants, which were used as a control group to support the findings, assuming that these background speakers have similar demographic characteristics as the informants.

The conversations included at least 8 minutes of speech per informant. Continuous speech of 8 minutes contained about 1000 words, including conjunctions, and excluding truncated words, unclear speech and chunks of laughter. These 8 minutes of recordings also contained the speech of speakers surrounding the informant, in a similar quantity of words, i.e. about 1000 additional words that were not uttered by the informant. These 1000 additional words were collected from all recordings and served as a control. See below for further details.

The research corpus includes SIH speakers. It is based upon recordings of spontaneous conversations, some of which were recorded

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\(^1\) For the definition of Spoken Israeli Hebrew see Section 4.1 below.
independently by the author for this study, others were taken from the CoSIH pilot (Corpus of Spoken Israeli Hebrew; see Harry and Izre’el 2003, Izre’el 2003). The research group includes 22 Israeli citizens and residents, native speakers of Hebrew, in different cross-sections. Non-native speakers were excluded from this research. This is because in the pilot study, in which a small group of non-native speakers was also investigated, differences were found between this group and the group of native speakers. Thus, in order to determine the basic TMA system, this study uses data from Israeli native speakers only. For additional details about the findings in different population groups in the pilot study, see Dekel 2009a. This research, furthermore, does not include minority groups such as Arabs, Druze, and others, who use Hebrew as a second language. These populations usually live in areas where Arabic is the first spoken language, and their contact with Hebrew is unlike that of other groups of Hebrew speakers, such as new immigrants, who are scattered among the Israeli population. The control group includes approximately the same number of additional speakers from the informants’ surroundings, who took part in the conversations. The demographic distribution of the population in this study was based upon the reports of the Israeli Central Bureau of Statistics (ICBS 2009), and included Israeli Hebrew native speakers, both males and females, ages 16 and up, from different origins and educational levels.

In this corpus an attempt was made to yield sub-groups of at least 5 informants, so that statistical significance of the linguistic characterization of one population group or another would be possible. For example, to check if the group of highly-educated women, ages 50-70, speak differently than a highly-educated group of men of similar ages. The distribution is presented in Table 2-1 below.
A matter of time: tense, mood and aspect in spontaneous spoken Israeli Hebrew

Table 2-1: Distribution of the research corpus according to cross-sections

<table>
<thead>
<tr>
<th>Age</th>
<th>Education</th>
<th>Origin and sex</th>
<th>Speakers per education group</th>
<th>Speakers per age group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Ashkenazi</td>
<td>Oriental</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Male</td>
</tr>
<tr>
<td>18-34</td>
<td>Up to14 (l-m)</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>15 and up (h)</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>35-49</td>
<td>Up to14 (l-m)</td>
<td></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>15 and up (h)</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>50-70</td>
<td>Up to14 (l-m)</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>15 and up (h)</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Total speakers by sex:</td>
<td>6</td>
<td>6</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Total speakers by origin:</td>
<td>12</td>
<td>10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

According to the above table, it is possible to check several, but not all, population groups. The groups which are compared and presented in this study are the younger age group (18-34; 13 speakers) vs. the other two age groups, combined (i.e. ages 35-70; total 9 speakers), the two groups of origin (Ashkenazi vs. Oriental), which contain 11 speakers each, the sex groups, which contain 11 male and 11 female speakers and the education groups of low to medium education level (12 speakers) vs. high education level (10 speakers).

About two thirds of the corpus were manually transcribed and annotated by the author. The remaining one third was manually transcribed and annotated by another linguist. Transcriptions and annotations were then switched between the author and the other linguist for QA checking to ensure their accuracy. Transcription was basically done using Hebrew orthography. After the corpus was fully transcribed and annotated, all the data were inserted into a database computer file, where they could be easily filtered and analyzed according to different criteria. In this file, all verbal forms were tagged according to their TMA category, form, pattern, root, and any other details, which might be
relevant for the analysis, such as voice and transitivity. The data were then sorted according to these tags and analyzed to obtain the number of occurrences for each of the cases.

The corpus was divided into speech units (SUs) rather than into sentences. Since discourse contains units, which are not sentences, the latter are irrelevant analytical units in spontaneous speech. For an explanation on speech units and the division guidelines, see Section 2.3.2 below.

2.2. collection and organization of the data

As mentioned above, the data for this research are recordings of spontaneous conversations, some of which were recorded by the author, others that were taken from the pilot corpus of SIH. Suitable informants were chosen from these recordings to yield a corpus, which would demographically represent the Israeli population and correspond to the data supplied by the Israeli Central Bureau of Statistics, see 2.1 above. The data are sorted according to several criteria (see 2.3.3 and 2.3.4 below).

In order to analyze speech, it is necessary to record the discourse and transcribe it. The transcription is a written representation of the recorded speech, which can be used for linguistic analyses, but it cannot stand alone without simultaneously listening to the parallel spoken text when analyzing, especially because it contains prosodic features, which can never be transcribed in such a way that the analyst can imagine the conversation exactly as it was originally uttered. The transcribed discourse is divided into speech units (SUs), which are elsewhere also referred to as prosodic units (PUs). For details on speech units, see section 2.3.2. There are several ways to transcribe texts. In some corpora the standard writing system of the language is used, in others phonetic symbols of different conventions are used (IPA, Sampa). The speech in this corpus is transcribed with standard Hebrew orthography. Text samples and examples in this thesis are phonetically transcribed using Sampa symbols (see Sampa transcription home page). Hebrew writing system is historical
and does not correspond to speech. For example, letters, which represent pharyngeal and emphatic sounds, are never pronounced as such. Some of them became identical in pronunciation to other sounds in the language; others were assigned new, European pronunciations. Also, two and even three different orthographic symbols can represent the same sound in speech. Therefore, it was decided to transliterate rather than transcribe the roots in this thesis using IPA symbols, so that the representation of roots in the orthography would be reflected.

This research, as mentioned above, is based upon continuous spontaneous conversations. These conversations include at least 8 minutes of speech per informant. The average number of words per speech minute of an informant in Israeli Hebrew was about 132 in the pilot study (see Dekel 2009a), including conjunctions and overlap chunks, and excluding truncated words, unclear speech parts and laughter chunks. Therefore, continuous speech of 8 minutes contains about 1000 words of the informant. These 8 minutes of recording also contain the parallel informants’ conversation mates, in a similar quantity of words, i.e. about 1000 additional words, which are not uttered by the informant. These 1000 additional words were collected from all recordings and were analyzed together, but separately from the group of informants, to serve as a control group. Additional recorded minutes were added as required if the minimum of 1000 words per informant was not met, so as to reach at least 1000 words for each of the informants, while words from the people surrounding the informants constituted an addition. The addition of these speakers doubled the number of words in the corpus. This way, a mini-corpus of at least 44,000 words was obtained (22 informants, 1000 words per informant + about 1000 words of the informant’s conversation mates x22 recordings), out of which about a half was uttered by the informants themselves. The rest of the words in the corpus (about 22,000 as well) are used as a control group to check and verify the findings, again assuming that the background speakers have similar demographic characteristics as the informant.

Previous studies define that a corpus suitable for linguistic analyses should include between 1000 to 20,000 words, depending on the type of
research (Oostdijk 1988:20, Biber 1990:258, Miller and Weinert 1998:10). Existing corpora of spoken languages are evaluated according to various criteria, such as the number of words in the corpus, the number of expressions in the corpus and the number of recorded speakers. Corpora that are measured by the number of recorded speakers, are usually meant for the speech recognition market (Elda, Appen). In these corpora each speaker utters several items, which are pre-defined as regards number and content. These items cover various categories, such as digits, company names, dates etc. The speakers are recorded in pre-defined environments and via pre-defined networks. Corpora meant for linguistic research can include different language communication channels (written or spoken), registers and speakers. For example, such corpora can contain journal chunks, as well as speech recorded on the street, where one speaker can utter only a few words, another speaker can provide a whole conversation, and a third speaker can produce a formal interview. Such corpora cannot be defined by the number of speakers, as each speaker contributes a different type and amount of speech to the corpus, whereas some of the chunks in the corpus represent written language and have no speakers. It is thus more convenient to measure such corpora by the number of words they contain. Each such corpus has a different amount of words, depending on the tested language and the research requirements. For example, the Corpus of Swedish of the University of Göteborg contains 1,200,000 words (and 1,400,000 tokens; Swedish corpus). The Corpus of French of the University of Provence contains about a million words (French corpus). The Corpus of Italian of the University of Florence contains about 650,000 words (Italian corpus). The Spoken Dutch Corpus contains 9,000,000 words, but only unknown small part of it is spontaneous speech (Dutch Corpus). These corpora represent much larger populations than the one used in this study, and are divided into many more cross-sections to also cover dialectal divergence. In addition, these corpora include language samples of different speech registers and levels, such as the media, formal meetings, courtrooms and the like, not only spontaneous spoken language. The part of spontaneous speech in these corpora can be relatively small. In the Swedish corpus, for
instance, out of the 1,400,000 tokens, only 6 speakers provided spontaneous conversations with a little more than 13,000 tokens.

In addition, many of these corpora were established for European languages. Hebrew words, having a more synthetic character, contain much more information each, than their counterparts in European languages, so that many Hebrew words are parallel to more than one word in European languages, for example:

The speech unit:

\[(1) \text{aXalti kSeu ba}\]
\[
\text{eat (ʔkl-SUF-1-SG) when he come (bwʔ-SUF-3-M-SG)}
\]
‘I was eating when he came’ (3 words in Hebrew)

is parallel to the English speech unit:

\[I \text{was eating when he came}\]

The different underline types denote which word in Hebrew corresponds to which words in English.

This research focuses on Spoken Israeli Hebrew (SIH hereinafter), in four main cross-sections: Sex, origin, age and education, see 2.1 above. The number of the Hebrew speaking Jewish population living in Israel by the end of 2008 is higher than 5.5 million (ICBS 2009). The number of the Hebrew speaking Jewish population born in Israel by the end of 2008 is higher than 3.8 million (ICBS 2009). It is assumed that the number of Hebrew native speakers is parallel to this number. Thus, 22,000 words of the informants and an additional 22,000 words of the informants’ conversation mates, are assumed as a sufficient quantity to represent some trends of the linguistic system investigated in this research. The speech chunks are transcribed and analyzed according to the research methods and data analysis methods detailed in 2.3 below. Transcription includes basic characteristics of discourse\(^2\).

2.3. Research methods and data analysis

2.3.1. Spontaneous discourse

The type of discourse guides the participants as regards the syntax to be used during speech (Karkkainen et al 2007:301). Usually, participants in the conversation take their turn to speak. In spontaneous conversations, under certain conditions, overlaps and pauses are part of the discourse, but still, most of the conversation, even when spontaneous, is based on turn-taking (Karkkainen et al 2007:306-309). Naturally, in spontaneous conversations, the speakers would use more subjective expressions than in other types of conversations, as their views about the spoken situation are expressed along the conversation (Karkkainen et al 2007:322-325). Self-repair is also a typical feature of spontaneous conversations, where the speakers make false starts and then repair their speech by re-starting it. Self-repair can be either syntactic or morphological. The syntactic type is a universal feature, and speakers use it in 20% of their expressions (Karkkainen et al 2007:336-337). The morphological repair depends on the type of language and its morphology (Karkkainen et al 2007:345).

An example of a discourse in Israeli Hebrew is provided in Appendix 1.

2.3.2. Division to Speech units

Speech units, according to which the texts are analyzed, vary in different types of texts. In written texts sentences are used. In spoken texts various kinds of divisions are used, one of which is prosodic units, which are speech units based on prosodic features. There is a wide range of terms assigned to prosodic units in the literature, such as: intonation units (Du Bois et al 1992:17, 1993:47), prosodic groups, and speech groups (Crystal 1997:171).

This research deals with spoken language, so that sentences are irrelevant as its analytical units. Therefore, prosodic units were used as the analytical units, and they will be referred to as speech units (SUs)
A matter of time: tense, mood and aspect in spontaneous spoken Israeli Hebrew

hereafter. A definition to show the differences between speech units in written and spoken texts is presented below for sentences.

There are two main definitions for a sentence: (a) a sequence of words containing a theme and a predicate to form a meaning; and (b) a sequence of words expressing one idea, which ends with a punctuation mark and begins after the previous sentence (Crystal 1997:94, Webster 2003:1134). A sentence, according to definition (b) is an independent, written syntactic unit with an independent meaning, regardless of its context. Its borders are determined by punctuation marks, and its structure reflects its writer's decisions (Miller and Weinert 1998:12, 30). Spoken texts have no punctuation marks, and each speech unit depends on the overall context. Thus sentences, as defined above, cannot be used as its analytical units (Miller and Weinert 1998:30). Many parts of discourse in spoken languages cannot be conceived of as sentences at all (Miller and Weinert 1998:40). Thus, prosodic units or speech units (see below), and not sentences, are used in this study.

Until recently, discourse units were referred to as intonation units (IU), and were defined as a sequence of speech produced under one coherent contour (Du Bois et al 1992:17, 1993:47). Intonation units, which are also called prosodic units/groups or speech groups, contain a combination of basic speech segments and prosodic elements. The basic speech segments include consonants and vowels, which are the building blocks of words. The prosodic elements are additional features which are suprasegmental and include for example rhythm, pitch, accents, stress and more (Crystal 1997:171). The borders of prosodic units are not determined only according to their intonation, but also according to other prosodic criteria, such as rhythm and length. Therefore, more recent studies have preferred the term prosodic units (PUs) as the basic analysis unit of spontaneous speech in several languages, and not intonation units (Quazza and Garrido, no year cited, Lee and Lee, no year cited, Portes et al 2002, Elordieta and Romera 2002, Tseng 2003). The notion of prosodic unit (hereinafter speech unit, SU) is used in this research as well.
2.3.3. Work methods and semantic sorting of the data

2.3.3.1. Tagging of relevant speech units

In all speech units, verbal forms were tagged in the transcribed text. Tagging was done on the transcription pages, where relevant speech units were marked differently than the rest of the text. Tagging was done manually, as currently automatic tagging in Hebrew is problematic.

2.3.3.2. Determination of the part which expresses tense, aspect or mood

Evaluation of the part which expresses TMA within the highlighted speech unit was then carried out. This was done to exclude cases where tense, aspect or mood, were expressed by lexical means and not by a pattern or a structure. For verification, words and structures were omitted from the text one at a time. This ensured that the TMA meaning was preserved, even when one word / structure or another was eliminated. If the meaning was not preserved, then the TMA meaning was carried by the omitted word. In this manner, the word / structure which bears the TMA meaning in the tested speech unit was isolated.

Examples:

(2) maXaR at oleXet abajita aXaRe abXina  (D-3-4-1: 102)
    tomorrow you (2-F-SG) go (hlk-Qal-PTCP-F-SG)
    home after the test
    ‘tomorrow after the test you will be going home’

The word maXaR ‘tomorrow’ was omitted from this unit, since it may be responsible for the future/modal meaning of the speech unit. The whole unit has a modal meaning, and the modal meaning was preserved after the omission of this word. However, an additional evaluation of this unit was required in order to verify the modal meaning. This unit, in its current form, bears an epistemic meaning, since it is an interpretation of the
situation by the speaker, a situation in which the speaker is not involved. At this step, components of this unit were replaced by other, parallel words, to see if the meaning was preserved. Thus, the pronoun at ‘you’ was replaced by i ‘she’, and the verb oleXet ‘go’ (hik-PTCP-Qal-F-SG) was replaced by kotevet ‘write’ (ktb-PTCP-Qal-F-SG) to eliminate cases where the meaning is part of the root semantics. The original, modal, meaning of the speech unit was preserved only when the pronoun was in the second person. Yet, leaving the second person pronoun in and changing the participle verb form into a prefixed form yielded a strange structure, one which would probably not be produced by native speakers during spontaneous speech (although it can be used in formal language). This meant that the modal meaning was carried by neither the pronoun, nor the participle, but probably by the combination of the two components. Similar units were found in my study, which had the same epistemic meaning. This unit was finally analyzed as expressing relative tense and not mood, since a relative time point (other than the word maXaR ‘tomorrow’) is noted in the context. The relative time point is aXaRe abXina ‘after the examination’.

(3) paam baRaX li naXaS katan] (N-4-34:38-39)
once escape (brh-Qal-SUF-3-M-SG) to me snake (SG)
small (M-SG)
‘once, a small snake escaped from me’

beulam aaRtsaot||
in the hall the lecture (PL)
in the lecture hall’

The expression paam ‘once’ might denote a single-time action, and hence was omitted to verify that the perfective aspect was preserved without it. Also, the suffixed form of the verb baRaX ‘escape’ (brh-Qal-SUF-3-M-SG) was replaced by the participle and prefixed forms of the same verb, one at a time. In these cases, the perfective aspect was not preserved, while both forms caused the unit to change meaning. Therefore, the perfective aspect was concluded to be part of the suffixed form of the verb baRaX ‘escape’. The past tense meaning is derived from
the broader context. This unit was thus classified as expressing the perfective aspect.

(4) *vejom eXad alaXti bejom XoRpil* (N-4-1:20)
and one day I walk (*hlk*-Qal-SUF-1-SG) in a day winter (ADJ)
‘and one day I walked in a winter day’

The expression *jom eXad* ‘one day’ was omitted to verify that the perfective aspect was preserved without it, since this expression might hint at a single-time event. Also, the suffixed form of the verb *alaXti* ‘I walk’ (*Qal*-SUF-1-SG) was replaced by the participle and prefixed forms of the same verb, one at a time. In the first case, where a participle was inserted instead of the suffixed form, a possible expression was obtained, which would potentially be used in an imperfective context (durative) under the condition that the word *ani* ‘I’ would be attached to it:

(5) *vejom eXad ani oleX bejom XoRpil*
and one day I walk (*hlk*-Qal-PTCP-M-SG) on a day winter (ADJ)
‘and one day I was walking on a winter day’

In the latter case, where a prefixed form was inserted instead of the suffixed form, and in the given context, the obtained unit would be illogical:

(6) *vejom eXad eleX bejom XoRpil*
and one day I walk (*hlk*-Qal-PRE-1-SG) in a day winter (ADJ)
‘and one day I will walk in a winter day’

In addition, the previous verbal units of this recording contained the same verb in a different structure, which enabled contrastive analysis. The previous units expressed a habitual aspect in the past, and contained the structure of *hjj* ‘be’ + participle, as follows:

(7) *veaiti oleX* (N-4-1:1, 6, 12)
and I be (*hjj*-Qal-SUF-1-SG) walk (*hlk*-Qal-PTCP-M-SG)
‘and I used to walk’

Therefore, the perfective meaning in example (4) was concluded to be part of the suffixed form of the verb *alaXti* ‘I walk’, and this unit was finally classified as expressing the perfective aspect.
Since the perfective aspect does not refer to the internal structure of the predicate, but rather to the predicate as one complete unit, most of the perfective forms in this research were not categorized as quantifying or qualifying. There were some exceptions. For example, where the action was clearly punctual. In these cases punctual aspect was noted. For these reasons, most of the perfective forms in this research are noted as ‘perfective’ only. Cases of punctual aspect are rare.

2.3.3.3. Form / structure isolation

From the highlighted speech units, which were filtered as carrying TMA meanings in the previous step, all verb patterns were isolated and classified into groups, where each group included data with the same structure. For details of the classification of forms see 2.3.4 below. A sample of the data sorting is presented in Figure 2-1 below.

![Figure 2-1: Processing of data – a sample of data sorting](image_url)
2.3.3.3.1. Handling participles

Participles can be used both as verbs and as nominals in Hebrew, and were thus considered problematic. The decision whether to refer to units containing participles as verbal or nominal was done on the basis of the function of the participle in that unit. This function was determined according to the context where the unit appeared. Participles that had a purely verbal meaning, were classified as such, whereas participles with nominal meanings (mainly when used as nouns and adjectives) were excluded from this research. A similar classification was applied by Azar (1995:1), where he distinguished between participles denoting an action or an event in progress, and participles denoting a state or a result. A similar classification was also done by Meltzer (2007), who defined when a participle is verbal and when it is nominal. Meltzer characterizes nominal participles by their possibility to appear in the same expression with a copula, i.e., to be turned into a description of manner by adding the word beofen ‘in a manner of’, to be negated by adding the word bilti ‘un-’ and by their correlation to other participles with a similar character, but not to other participles with a verbal character. Examples for Meltzer’s claims are presented below. The first example in each couple is a nominal participle, the second is a verbal participle.

Original expressions:

(1) jeled meanjen
boy interesting (ʕnjn-Piel-PTCP-M-SG)
‘an interesting boy’

(2) * jeled kofets
boy jumping (qpts-Qal-PTCP-M-SG)
* ‘a jumping boy’ (ungrammatical in Hebrew)

Expressions with copula verbs:

(3) hajeled nire meanjen
the boy look interesting (ʕnjn-Piel-PTCP-M-SG)
‘the boy looks interesting’
Expressions turned into a manner description:

(5) * beofen meanjen
in manner interesting (ʕnjn-Piel-PTCP-M-SG)
‘in an interesting manner’

(6) * beofen kofets
in manner jumping (qpts-Qal-PTCP-M-SG)
* ‘in a jumping manner’

Negated expressions:

(7) bilti meanjen
un-interesting (ʕnjn-Piel-PTCP-M-SG)
‘not interesting’

(8) * bilti kofets
un jumping (qpts-Qal-PTCP-M-SG)
* ‘un-jumping’

Correlation to other participles:

(9) * jeled meanjen vekofets
boy interesting (ʕnjn-Piel-PTCP-M-SG) and jumping (qpts-Qal-PTCP-M-SG)
* ‘an interesting and jumping boy’

In spite of her claims and examples, we can find participles in Hebrew, which can be either verbal or nominal, where the verbal / nominal meaning is context-dependent, for example:

(10) aiS aze matsXik
the man this funny
(11) abadRan matsXik et ajeladim
the entertainer make laugh
* the children
‘this man is funny’ 'the entertainer makes the children laugh’
Examples for verbal and nominal participles in the corpus are presented below.

**Verbal:**

(12) *ze lo oved* (C 7-1-4:272)  
*it no work* (*ʕbd*-Qal-PTCP-M-SG)  
‘it is not working’

(13) *anaXnu matimim* (G 4-2-3:755)  
*we fit* (*tʔm*-Hifil-PTCP-M-PL)  
‘we fit each other’

(14) *em osim meXkaR* (C 2-1-1C:55)  
*they do* (*ʕsj*-Qal-PTCP-M-SG)  
‘they are carrying out a research’

(15) *at tsodeket* (G 7-1-1:291B)  
*you (F-Sin) right* (*tsdq*-Qal-PTCP-F-SG)  
‘you are right’

(16) *i mitXatenet* (G 8-1-3:54)  
*she marry* (*ħtn*-Hitpael-PTCP-F-SG)  
‘she is getting married’

(17) *mamaS mafXid* (D 6-3-1:232)  
*indeed scaring* (*pħd*-Hifil-PTCP-M-SG)  
‘it is indeed scaring’

**Nominal:**

(13)

**2.3.3.3.2. Expression of TMA in more than one speech unit**

In verb phrases with two words or more, there are cases in which TMA is expressed in two subsequent speech units, and sometimes even three, where the first part of the verb phrase is uttered in the first unit and its remaining part(s) is/are uttered in the subsequent unit(s). Such structures were highlighted for further investigation in order to see if these TMA expressions are different from other verbal forms, due to their spreading out over a wider range of speech units. Examples for verb phrases which spread over more than one unit are presented below.
A matter of time: tense, mood and aspect in spontaneous spoken Israeli Hebrew

2.3.3.3. Subordinate speech units

Some of the forms that express TMA appear as part of subordinate units. A subordinate unit is a syntactic part of the expression that constitutes an argument of a higher predicate, or one that is governed by a higher predicate in the expression, in order that its meaning will be complete (Hengeveld 1992:12). Two subordinate units are presented below, the former shows a completion of the verb phrase Rotse livdok ‘want to check’, the latter shows a completion of a verb of direct speech. The direct speech part can stand alone, but if we refer to it as an independent unit, it will be impossible to combine it within the text sequence, since it will entail changes in its original meaning. The material from subordinate units was also collected separately, in order to check for differences in usage between dependent and independent speech units.

Examples for subordinated speech units expressing aspects:

(1) amaRt baeRev at Rotsa
    liStof] (C 2-1-1)
    you say in the evening
    you want (rtsj-Qal-PTCP-F-SG)
    wash (štp-INF)
    ‘you said (that) in the evening
    you wanted to wash’

(2) miSpaXti lakXa oti lejafo|
    leexol glida mastik] (C 2-1-1)
    my family take
    (lqh-Qal-SUF-3-F-SG) me to Jaffa
    eat (?kl-INF) ice cream
    ‘my family took me to Jaffa
to eat ice cream’

(3) ktsat itXalti|
    leitkatev im &/ (C 4-1-2)
    a little I start
    (thi-Hifil-SUF-1-SG)
    to correspond (ktb-INF) with &
    ‘I started
    corresponding with & a little’

(4) u javo elaiX|
    leitXabeR elaiX] (G 7-1-1)
    he come (bwʔ-Qal-PRE-3-M-SG)
to you (F)
    to connect (hbr-INF) you
    ‘he will come to you
to connect you’
2.3.3.3.4. Speech units containing two TMA elements

Some of the speech units in the corpus express more than one TMA element. These units were isolated to see if both TMA components are grammaticalized or only one of them. For example, the speech unit below denotes perfective aspect and epistemic mood:

\[
\text{em kvaR XaSvu al akol| (C-2-1-1:114)}
\]

they already think \((hšb-Qal-SUF-3-PL)\) of everything

‘they have already thought of everything’

The verb in this unit is a combination of the root \(hšb\) ‘think’ in a suffixed pattern. Other verbs from the same root were found in the research, and were compared to this one. In all occurrences of the root \(hšb\) ‘think’ a modal meaning is found. Yet, the aspectual perfective meaning change, when the pattern changes. Also, other suffixed forms do not express modal meanings. Therefore, it is concluded that the modal meaning is lexical, i.e., is inherited in the root, and is not grammaticalized. This unit was analyzed as perfective.

2.3.3.4. Semantic classification of forms and structures

At this stage, following classification of all the data into groups, each occurrence of each form / structure was checked separately. In speech units with TMA-bearing forms / structures, it was necessary to determine which part of the form / structure was responsible for its meaning: the form
A matter of time: tense, mood and aspect in spontaneous spoken Israeli Hebrew

/ structure itself, or some other element. Hebrew verbal forms / structures are synthetic, and thus each word may contain several meaningful elements. To determine which of the elements in the form / structure is the TMA-bearing element, contrastive analysis was carried out. The checked form / structure was compared to other forms from the sample and if possible from the same text and same speaker – which were apparently identical to the checked form, but different from it in only one element. This element could be the root, a synthetic, form-contained pronoun or similar. Also, the form was compared to other forms having the same root. This was done to verify that the semantic category is indeed carried by the form, and not by the root, which in Hebrew may contain modality, for instance, as part of its basic semantics.

Table 2-2 below shows examples of forms sharing similar meanings, having different patterns and different classifications; Table 2-3 shows examples of identical patterns with different roots, which were classified identically.

**Table 2-2: forms having similar meanings but different patterns and their TMA classifications**

<table>
<thead>
<tr>
<th>Form</th>
<th>Root</th>
<th>Pattern</th>
<th>TMA category</th>
<th>Reference</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>olex</td>
<td>hlk (k is realized as X)</td>
<td>Qal-PTCP</td>
<td>AS – PROG</td>
<td>D-3-4-1:51</td>
<td>An ongoing action</td>
</tr>
<tr>
<td>olexet</td>
<td></td>
<td>MD – EPS</td>
<td>D-3-4-1:102</td>
<td></td>
<td>An interpretation of</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>G-7-1-1:421</td>
<td></td>
<td>the situation by the</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>speaker</td>
</tr>
<tr>
<td>alaX</td>
<td>Qal-SUF</td>
<td>AS – PFV</td>
<td>C-2-1-2:212</td>
<td></td>
<td>An external observation on</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>G-4-2-3:206</td>
<td></td>
<td>the action as a complete</td>
</tr>
<tr>
<td>alaXi</td>
<td></td>
<td></td>
<td>D-3-4-1:25</td>
<td></td>
<td>unit</td>
</tr>
<tr>
<td>teleX</td>
<td>Qal-PRE</td>
<td>MD – DEO</td>
<td>G-4-2-3:774</td>
<td></td>
<td>The speaker expresses will</td>
</tr>
<tr>
<td>olex oXel</td>
<td>hlk+ʔkl</td>
<td>PTCP + PTCP</td>
<td>AS – HAB</td>
<td>C-2-1-1-C:130</td>
<td>A habit</td>
</tr>
<tr>
<td>tsaaRajm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>olex lifgo</td>
<td>hlk+pgš</td>
<td>PTCP + INF</td>
<td>MD – DEO</td>
<td>C-2-1-1-C:103-104</td>
<td>Speaker’s intention</td>
</tr>
</tbody>
</table>
The table presents several inflections of the verb *alaX* ‘walk, go’ (root: *hlk*), where all forms have the common meaning of walking. The inflections are incorporated into various verb patterns, and denote various TMA categories. It can be seen from the table that no correlation was observed between the root *hlk* and TMA categories, which means that the meanings were not carried by the root.

**Table 2-3: forms having similar patterns but different roots and their TMA classification**

<table>
<thead>
<tr>
<th>Form</th>
<th>Root 1</th>
<th>Root 2</th>
<th>Pattern</th>
<th>TMA category</th>
<th>Reference</th>
<th>Explanation</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>tsoeX</em></td>
<td><em>q</em></td>
<td><em>q</em></td>
<td>Qal-PTCP</td>
<td>AS-HAB</td>
<td>G-7-1-1:162</td>
<td>A habit</td>
<td><em>q</em> is not realized; <em>k</em> is realized as <em>k</em></td>
</tr>
<tr>
<td><em>lokeX</em></td>
<td><em>q</em></td>
<td><em>q</em></td>
<td>G-4-2:3:56</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>alaX</em></td>
<td><em>hlk</em></td>
<td><em>hlk</em></td>
<td>Qal-SUF</td>
<td>AS-PFV</td>
<td>C-2-1-2:212</td>
<td>An external observation on the action as a complete unit</td>
<td><em>k</em> is realized as <em>X</em></td>
</tr>
<tr>
<td><em>amaR</em></td>
<td><em>mr</em></td>
<td><em>mr</em></td>
<td>G-4-2:3:732</td>
<td></td>
<td></td>
<td></td>
<td><em>q</em> is not realized</td>
</tr>
<tr>
<td><em>jatsa</em></td>
<td><em>tsa</em></td>
<td><em>tsa</em></td>
<td>G-7-1:1:259</td>
<td></td>
<td></td>
<td></td>
<td><em>k</em> is realized as <em>X</em></td>
</tr>
<tr>
<td><em>alaXt</em></td>
<td><em>hlk</em></td>
<td><em>hlk</em></td>
<td>D-3-4:1:25</td>
<td></td>
<td></td>
<td></td>
<td><em>k</em> is realized as <em>X</em></td>
</tr>
<tr>
<td><em>Xalamti</em></td>
<td><em>hlm</em></td>
<td><em>hlm</em></td>
<td>G-8-1:2:33</td>
<td></td>
<td></td>
<td></td>
<td><em>h</em> is realized as <em>X</em></td>
</tr>
<tr>
<td><em>amaRt</em></td>
<td><em>mr</em></td>
<td><em>mr</em></td>
<td>G-4-2:3:199</td>
<td></td>
<td></td>
<td></td>
<td><em>q</em> is not realized</td>
</tr>
<tr>
<td><em>teleX</em></td>
<td><em>hlk</em></td>
<td><em>hlk</em></td>
<td>Qal-PRE</td>
<td>MD-DEO</td>
<td>G-4-2:3:774</td>
<td>The speaker expresses will</td>
<td><em>k</em> is realized as <em>X</em></td>
</tr>
<tr>
<td><em>teSev</em></td>
<td><em>jśb</em></td>
<td><em>jśb</em></td>
<td>G-12-4:1:151</td>
<td></td>
<td></td>
<td></td>
<td><em>j</em> is not realized; <em>b</em> is realized as <em>v</em></td>
</tr>
<tr>
<td><em>oleX oXel</em></td>
<td><em>hlk</em></td>
<td><em>hlk</em></td>
<td>Qal-PTCP + Qal-PTCP</td>
<td>AS-HAB</td>
<td>C-2-1-1:150</td>
<td>A habit</td>
<td><em>k</em> is realized as <em>X</em>; <em>q</em> is not realized</td>
</tr>
<tr>
<td><em>tsaaRajm</em></td>
<td><em>qkl</em></td>
<td><em>qkl</em></td>
<td>G-4-2:3:57</td>
<td></td>
<td></td>
<td></td>
<td><em>b</em> of <em>jśb</em> is realized as <em>v</em></td>
</tr>
</tbody>
</table>

The table presents various verb inflections with different roots. The examples are mostly in the Qal pattern. For the complete results, see Section 5. This classification was done to determine if there is a direct relation between a specific affix and a TMA category. The table clearly shows that there is no correlation between the verb pattern and TMA categories, as each of the examples in the Qal pattern denotes a different
TMA meaning. On the other hand, it is clearly seen that there is some correlation between affixes and TMA categories. As in all forms where participles are included the meaning is a habitual aspect, whereas prefixed forms denote mood and suffixed forms denote perfective aspect.

2.3.3.5. Listing of linguistic means used to express TMA

At this last step, listing of the means that are used to express TMA in SIH was performed. This listing enabled evaluation of the quantitative relationships between various linguistic ways to express TMA and their distribution.

2.3.4. Methods for formative sorting of the data

Structures expressing TMA were inserted into a database in a computer file. In the file, they are sorted according to their form / structure, as illustrated in figure 2-1 above.

For example, all prefixed forms of verbs are classified as one group, all phrases of *hjj* ‘be’ + participle are classified as another group and so on. In the database, the data are sorted according to linguistic categories, age groups, education, sex and origin, and according to TMA categories. For the determination of the semantic categories, see Section 3 below. Verbs, including complex phrases and structures, are marked for their TMA categories. Each verb-oriented group is provided with detailed analyses to the level of roots, patterns or any other detail, which might be relevant for the analysis, including voice and transitivity. The database is designed to enable easy extraction of the data according to various criteria, i.e. to enable the characterization of different groups of data or population according to research needs. For example, it is relatively easy to extract all verbal data in the research relating only to native speakers of a specific age group and which are classified as expressing mood.
2.3.5. Statistical methods for the analysis of the data

The following parameters were checked in the data (see 2.3.4 above):

- Structures with a low number of instances were excluded from the research. The chosen threshold for the number of instances was 10, similar to the pilot study. The reason for this decision is because with few instances statistical calculations cannot be performed. Further, statistical calculations with only a few occurrences are not representative, their error rate is too high and finally they are negligible in relation to the general statistical calculations because of their number.

- After the exclusion of rare structures, the remaining data constitute the actual research findings. In these data, quantitative distribution and distribution in percentages were calculated for each semantic category and each structure in each population group.

- Correlation coefficient tests were carried out, to check the relations between various population groups and the use of structures. Correlation tests are meant to check the relations between two independent variables, for example, the relationship between the education level of speakers and the use of specific structures in language or the relationship between two population groups.

2.4. Schematic description of the research process

A schematic description of the research process is presented in Figure 2-2 below.
A matter of time: tense, mood and aspect in spontaneous spoken Israeli Hebrew

Figure 2-2: Schematic description of the research process

Sample

Corpus
Recordings

Data segmentation

Data sorting

Select continuous speech chunks of at least 8 minutes; transcribe; list and analyze verb forms

Classify by form, structure and meaning; classify according to populations; calculate initial statistics

Research methods

Data analysis

Results

Result sorting

Additional statistical calculations if needed

Analysis of results and discussion

Summary and conclusions

Sample Corpus Recordings

Data segmentation

Data sorting

Select continuous speech chunks of at least 8 minutes; transcribe; list and analyze verb forms

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Figure 2-2: Schematic description of the research process