

Lexical and Developmental Aspects of  
*Alef* and *He* as Root Letters in the Hebrew  
Verb System:  
A Psycholinguistic Study

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Ph.D. Thesis

Submitted to the Senate of Bar-Ilan University

Ramat-Gan, Israel

March, 2016

## **Abstract**

The topic of this study is the Hebrew letters *Alef* (א) and *He* (ה), as members of the אהו"י AHWY letters, which represent both vowels and consonants. They exemplify the connection between the spoken and written language on the one hand, and between both forms of the language and their grammar on the other. There is a gap between the phonological and orthographical representations of *Alef* and *He* which is mediated by morphology. The mediation of the morphological system permits the establishment of systematic rules for the appearance of these letters and facilitates acquisition. Through the prism of the letters *Alef* and *He*, this study demonstrates the weakness of the link between orthography and phonology, affirms the mediating role of morphology in the Hebrew writing system and correlates the development of their representation in the writing system as a function of these characteristics.

The object of this study is to characterize two letters which are located at the core of the complexity of Hebrew orthography in terms of their representation in the language and their development in writing, and to examine the system of connections between these two aspects. The study has two parts: lexical and developmental. The objectives of the lexical part are to map the letters *Alef* and *He* as root letters in the verbal system in their dual roles as consonants and vowels; to use morphological tools to establish regularity in spite of the irregularity and entropy that characterize their usage; and to investigate the degree of occurrence of forms containing these letters as vowels and consonants. The objectives of the developmental part are to investigate the process of acquisition of the letters *Alef* and *He* as root letters in the Hebrew writing system in their roles as vowels and consonants and to investigate the influence of the occurrence of forms containing them in the language on their representation in writing.

The letters *Alef* and *He*, as part of the AHWY אהוי"י letters, are considered to be the most problematical in Hebrew for children and adults alike. They represent both vowels and consonants and are used in place of vowels in the unpointed Hebrew writing system – an opaque system characterized by deep orthography. Their notation both as consonants and also, and especially, as vowels is unstable and even somewhat arbitrary, and depends on a complex system of considerations. These characteristics place them in a difficult and complex location for acquisition, due to their dual role as vowels and consonants and the lack of consistency and regularity in their representation.

Although the AHWY אהוי"י letters are classified as a homogeneous group, each one behaves in its own way as a function of its roles from a orthographical and phonological point of view, mediated by morphology. Therefore it is necessary to examine each one separately and state their attributes not only as a group but also as sub-groups and individually. This study focuses on the letters *Alef* and *He* within the AHWY אהוי"י group because of their relatively consistent presence in Hebrew orthography as morphemes, which allows them to be used as a tool to examine the gap between orthography and phonology, the position of the morphological system in the relationship between these two letters, and their development in the writing system as a function of these characteristics. The study was limited to examining them as root letters since knowledge about them in this role is insufficiently well-established. Because of their complexity they were investigated in the verbal system, which is a closed and consistent system both quantitatively and qualitatively.

This study is based on the psycholinguistic perspective which sees language as a cognitive representation system and is interested in the means by which linguistic knowledge is acquired, organized and represented. The approach to language learning on which the study is based is the statistical probabilistic approach, according to which

learning depends on environmental input, both in terms of quality and in terms of quantity, and on the individual skills in organizing information and data mining from the input. Efficiency of learning is a function of a series of psycholinguistic factors including regularity, consistency, and frequency. In Hebrew these factors are a function of phonological, morphological and orthographic elements. In this study the psycholinguistic and linguistic elements are correlated. That is to say, the principles of consistency, regularity and frequency are examined as a function of the phonological, morphological and orthographic elements through the prism of the letters *Alef* and *He*. The irregularity of their representation as vowels and consonants demonstrates the factor of regularity from among the psycholinguistic factors that influence acquisition; the examination of indexes of occurrence (frequency and family size) demonstrates the factor of frequency among these psycholinguistic factors.

In **Part One** of the study the letters *Alef* and *He* were mapped phonologically and morphologically and the occurrence of forms containing these letters in the language was examined. For the purposes of this mapping, information was collected from the lexicon concerning all roots containing *Alef* and *He*, and all forms derived from these roots in the system of verbs. The data was mapped according to phonological criteria – the degree of vocality of the letters as vowels or consonants – and morphological criteria – the location of the letters in the root, their position in the derived form, the different root patterns (*gizrot*), and their distribution among conjugations (*binyanim*). The occurrence of the derived forms was also examined in terms of the frequency of the form and its morphological family size. In addition the juncture between these domains was examined, that is to say, the letters were examined in their phonological roles as vowels and consonants as related to each morphological category and as related to the degree of occurrence of the forms in the language. Via this mapping and

examining the juncture between the domains the letters *Alef* and *He* were characterized and their habitat was defined.

The results of the mapping clarify the vocalic diversity of the letters *Alef* and *He*. *Alef* mostly functions as a consonant, either a full consonant or a semi-consonant, and also as a vowel. *He* is mostly a vowel but also functions as a consonant, and in some cases is dropped in inflected forms. Both letters are examples of the same pattern with respect to the forms in which they occur, from the point of view of their degree of occurrence in the language. Most forms containing *Alef* and *He* belong to small- or medium-sized morphological families with low or medium frequency. This is the case whether they function as consonants or vowels, that is to say neither vocalic role has a higher rating than the other in terms of frequency or family size. Another conclusion from the mapping is that morphological features – the position of the letter in the root, the root pattern, the conjugation and tense of the inflected form – determine the vocalic character of the letter and influence the distribution of the letters as vowels or consonants. *Alef* functions as a consonant when it appears in initial position and as a vowel when it appears in final position. Its vocalic diversity only appears when it is in a medial position. In such a position, it may function as a consonant, a semi-consonant, or a vowel depending on its position in the syllable, which is a consequence of its location in the root, the conjugation, tense and root pattern in which it appears. As for *He*, in initial or medial position it functions only as a consonant, and has vocalic diversity only when in final position. There it is usually a vowel, except for cases where it is marked with a *mappiq* (מֶ) and acts as a consonant, or where it is dropped in inflection. Its position in the inflected form is determined by its location in the root, regardless of conjugation or tense. In conclusion, the decisive factor determining the

vocalic character of the letter *He* is its position in the inflected form as a consequence of its location in the root, but in the case of the letter *Alef* its character is determined by a combination of the factors of its location in the root, the root pattern, the conjugation and the tense. As a result of the mapping of *Alef* and *He* the intimate and complex connections between the writing system and the abstract stratum of Hebrew grammar, especially morphology, are more clearly revealed. It appears once again that the morphological system acts as a mediating factor between orthography and phonology.

**Part Two** examines the process of acquisition of *Alef* and *He* in the writing system as a function of their differing roles as vowels and consonants and as a function of the degree of occurrence of forms containing them in the language. The degree of occurrence of the forms is investigated according to two indexes: their frequency and morphological family size. These indexes influence the occurrence of the form and thus their degree of exposure, which in turn influences their acquisition.

In the investigation of the process of acquisition there were 133 test subjects with typical development from five different age groups: third grade, fifth grade, eighth grade, eleventh grade and students. The material used for measuring representation of the letters was a written test derived from the systematic mapping of the letters conducted during the first part of the study. The test included verbs with *Alef* and *He* as root letters, both vowels and consonants, in different conjugations and tenses. The items in the test were grouped into forms containing *Alef* and *He* as vowels and consonants, of high- and low-frequency, and forms containing *Alef* and *He* as vowels and consonants belonging to large and small morphological families.

The results of the study reveal that acquisition of *Alef* and *He* develops gradually by age and reaches full acquisition by eleventh grade. Significant steps in acquisition are perceptible between third and fifth grade and between fifth and eleventh grade. There

is a gap between the representation of *Alef* and *He* as consonants and their representation as vowels, with the representation as consonants being more easily acquired. In the case of *Alef* this gap is detectable in third and fifth grade, but in the case of *He* it is perceptible throughout development. A further result was that the indexes of occurrence – frequency and family size – influence the representation of the letters in writing, and their effect is more significant when the representation of the letter is unstable. The frequency of verbs influences the representation of both *Alef* and *Hey*, both when functioning as vowels and when functioning as consonants, but its influence on them is more significant when they act as vowels. Family size influences the representation of *Alef* in third, fifth and eighth grade, but in eleventh grade and the student group no difference was detected between large and small families. In the case of vowel *Hey* family size had an influence for all ages, but in the case of consonantal *Hey* family size influenced third, fifth and eighth grade, but had no influence on representation for eleventh grade and students.

The results of the study are consistent with other literature in the field with respect to the difference in representation and acquisition between vowels and consonants, and posits the influence of frequency and family size on acquisition. Our results correspond especially to the statistical probability approach to language learning which sees learning as a function of factors of regularity, consistency and frequency. The factors of regularity and consistency appear in the characterization of *Alef* and *Hey* as functioning as both consonants and vowels with a wide spectrum of vocalic diversity in an irregular fashion. The factor of frequency appears in the indexes of occurrence in the study which were found to influence acquisition. A complex morphological system underlies these factors in Hebrew, especially with respect to *Alef* and *Hey*, which

influences their regularity, consistency and frequency, and plays a role in their acquisition via these factors.

The unique feature of this study is the examination of letters that play a central role in the Hebrew writing system with respect to both their representation in the language and their acquisition in the script. Thus the study links the nature of the language and its linguistic typology to the representation and acquisition of the language for Hebrew speakers and writers. The results of the study reveal the importance of the behaviour of letters in the language for the development of writing skills, emphasize the importance of explicit instruction of morphological information which acts as a key to finding system and regularity in the language, and stress the necessity of exposure to vocabulary as a tool to break down the difficulty encapsulated in them and ease their acquisition.