

The origin of the IPA schwa

Asher Laufer

The Phonetics Laboratory, Hebrew Language Department,
The Hebrew University, Mount Scopus, Jerusalem 91905, Israel
asher.laufer@mail.huji.ac.il

ABSTRACT

The symbol ⟨ə⟩ in the International Phonetic Alphabet was given the special name "Schwa". In fact, phoneticians use this term to denote two different meanings: A precise and specific physiological definition - "a mid-central vowel" - or a variable reduced non-defined centralized vowel.

The word "schwa" was borrowed from the Hebrew grammar vocabulary, and has been in use since the 10th century. The **Tiberian Masorah** scholars added, already in the late first millennium CE, various diacritics to the Hebrew letters, to denote vowel signs and cantillation (musical marks). Practically, we can consider them as phoneticians who invented a writing system to represent pronunciation. They used the term שְׁוָא [ʃwa] and graphically marked it with a special sign (two vertical dots beneath a letter [,]).

The linguistic schwa ə and the Hebrew schwa share a few characteristics, but they are actually distinct. The common name causes misunderstandings and mistakes.

Keywords: History of schwa; Hebrew; Phonetic Universals; Phonology-Phonetics.

1. INTRODUCTION

The symbol ⟨ə⟩, a rotated lowercase letter e in the International Phonetic Alphabet, was given the special name "**Schwa**" (or "Shwa"). In fact phoneticians use this term to denote two meanings:

1. On the one hand, this IPA schwa has a precise and specific physiological definition: "a mid central vowel". Acoustically the formants for a schwa as spoken by an adult male, whose vocal tract is 17.5 centimetres long, are: F1 at 500 Hz, F2 at 1500Hz, and F3 at 2500 Hz. People whose vocal tracts are longer or shorter than 17.5 cm will have different frequencies for these formants, but the pattern of 1x-3x-5x will be the same (e.g. [8, 16, 3]).
2. On the other hand, practically, phoneticians use the same term "schwa" and its sign [ə] to describe also *a variable reduced non-defined centralized vowel*. Various acoustic and articulatory measurements have proven that schwa vowels are very variable in quality and can occupy almost any position in the vowel space (e.g. [1, 5, 3, 18]).

We will refer here to those two kinds of schwa as "the **linguistic schwa**", to distinguish them from what we call "the **Hebrew schwa**".

2. HISTORY OF THE "SCHWA"

The word "**schwa**" was borrowed from the vocabulary of the Hebrew grammar, which has been in use since the 10th century. The **Tiberian Masorah scholars** added various diacritics to the Hebrew letters to denote vowel signs and cantillation (musical marks). Actually, we can consider these scholars as phoneticians who invented a writing system to represent their Hebrew pronunciation. Already in the 10th century the Tiberian grammarians used this Hebrew term שְׁוָא (pronounced [ʃva] in Modern Hebrew), and graphically marked it by two vertical dots beneath a letter [,], as underneath the first letter of this Hebrew term שְׁוָא.

The Masorah scholars were very economical in using signs, and did not refrain from using the same sign for different purposes. In order to make sure that the meaning of a sign will be clear and lead to a precise pronunciation, they described the phonetic values of these signs in their numerous medieval manuscripts. (Description of several of the Tiberian Massorah publications can be found in various encyclopaedias. A short Introduction to the Massorah see [7].) If we follow their descriptions we will never confuse the pronunciation of one sound with another sound although they have the same sign. E.g. The Hebrew sign for schwa [,] has two meanings: The **mobile schwa** and the **silent (quiescent) schwa**:

1. The silent schwa is always at the end of a syllable, and it indicates a zero vowel sound.
2. The mobile schwa is always at the beginning of a syllable, and the sign only indicates shortness. All other Tiberian vowel signs mark vowel qualities, but the mobile schwa by itself does not indicate the quality of a specific vowel; it only indicates that the vowel is short. As for the quality of this schwa, it is susceptible to its neighbours, and can be one of the 7 vowel qualities of the Tiberian vowel system. In their numerous publications the Tiberian scholars give precise rules for the pronunciation of the schwa. I summarized these rules in table 1:

Table 1: The Tiberian rules for the pronunciation of the mobile schwa

A. The quality of a schwa under a letter preceding a guttural letter imitates its vowel, but is pronounced short. Examples:

1. In a word like **וְאִם** [wī'ʔim] ('and if') - the schwa is a short /i/;
2. In a word like **בְּאֵר** [bē'ʔer] ('well') - the schwa is a short /ē/;
3. In a word like **בְּאֶרֶץ** [bē'ʔeres'] ('in a land') - the schwa is a short /ē/;
4. In a word like **וְחַג** [wā'hag] ('and a holiday') the schwa is a short /ā/;
5. In a word like **בְּצֶמֶם** [bṣ'ʕom] ('in a nation') the schwa is a short /ō/;
6. In a word like **תְּהוֹם** [tō'hom] ('abyss') the schwa is a short /ō/;
7. In a word like **דָּעִי** [dū'ʕu] ('you should know') the schwa is a short /ū/.

B. The schwa under a letter preceding a consonantal "yodh", /j/, is pronounced a short /i/, as in **בְּיָדְךָ** [bīja'dex] ('in your (fem.) hand').

C. In all other cases the mobile schwa is realized [ä], as in **בְּנֶה** [bä'ne] ('you (mas.) build!').

(These rules are according to the Tiberian Massorah publications and are repeated in Hebrew grammar publications of the 10-14th centuries (e.g. [9, 12, 13]).

It is worthwhile mentioning that these Tiberian rules are meticulously kept to these days in prayers and in the reciting of the Hebrew Bible by all the Jewish Yemenite communities [12, 13]. However, in Modern Hebrew, the historical mobile schwa is realized either as the phoneme /e/ or as zero (complete absence of a vowel).

3. SHORTNESS IS PHONEMIC IN TIBERIAN HEBREW

The quality of the Tiberian mobile schwa is contextually variable, and it assimilates with its

segmental context. It is a short vowel that lacks a well-defined target, and therefore it co-articulates with the surrounding segments and naturally it tends to gravitate towards the centre of the vowel space. In the corpus of the Tiberian Bible we can find minimal pairs, like the ones shown in table 2, of short vowels contrasting regular ones, as well as of short vowels contrasting with each other.

Table 2a: Short vowels contrasting regular ones

• בְּאֵר /bē'ʔer/ ('well')	~ בְּאֵר /be'ʔer/ ('explained')
• לְצֶמֶם /lṣ'ʕom/ ('to a nation')	~ לְצֶמֶם /lṣ'ʕom/ ('to the nation')
• דָּמִי /dā'mi/ ('be silent')	~ דָּמִי /dō'mi/ ('my blood')
• רִי /s'ʕ'ri/ ('medicine')	~ רִי /s'ʕ'ri/ ('my enemy')
• עָנִי /ʕā'ni/ ('misery')	~ עָנִי /ʕō'ni/ ('you (f.) answer!')

Table 2b: Short vowels that contrast each other

• אֲנִי /ʕā'ni/ ('I, myself')	~ אֲנִי /ʕō'ni/ ('fleet')
• עָנוּ /ʕā'nu/ ('you (p.) answer!')	~ עָנוּ /ʕē'nu/ ('you (p.) sing!')
• עָלִי /ʕā'li/ ('you (f.) go up!')	~ עָלִי /ʕē'li/ ('pestle')
• דָּמִי /dā'mi/ ('I, myself')	~ דָּמִי /dō'mi/ ('you (f.) be silent!')
• הָלִי /hā'li/ ('ornament')	~ הָלִי /hō'li/ ('illness')

We cannot agree with the saying "vocalic schwa is pronounced in reading traditions as an allophone of zero" (e.g. [20]). It is true that contrasts like the ones shown in Table 2 are not as common as contrasts between regular vowels, but, as we say, "once a phoneme - always a phoneme"; therefore shortness is phonemic in Tiberian Hebrew. To conclude, Tiberian Hebrew had 7 qualities of regular vowels and 7 qualities of short ones, as shown in Fig. 1.

- The Hebrew and the linguistic Schwas are commonly restricted to unstressed syllables. Historically they are the outcome of neutralization of vowel qualities or of epenthetic vowels inserted to break up consonant clusters.

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