

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 [ʃva] 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** [wǝ'ʔim] ('and if') - the schwa is a short /i/;
2. In a word like **בְּאֵר** [bǝ'ʔer] ('well') - the schwa is a short /ǝ/;
3. In a word like **בְּאֶרֶץ** [bǝ'ʔeres'] ('in a land') - the schwa is a short /ǝ/;
4. In a word like **וְחַג** [wǝ'hag] ('and a holiday') the schwa is a short /ǝ/;
5. In a word like **בְּצֹמ** [bǝ'ʔom] ('in a nation') the schwa is a short /ǝ/;
6. In a word like **תְּהוֹם** [tǝ'hom] ('abyss') the schwa is a short /ǝ/;
7. In a word like **דָּעוּ** [dǝ'ʔu] ('you should know') the schwa is a short /ǝ/.

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

C. In all other cases the mobile schwa is realized [ǝ], as in **בְּנֵה** [bǝ'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

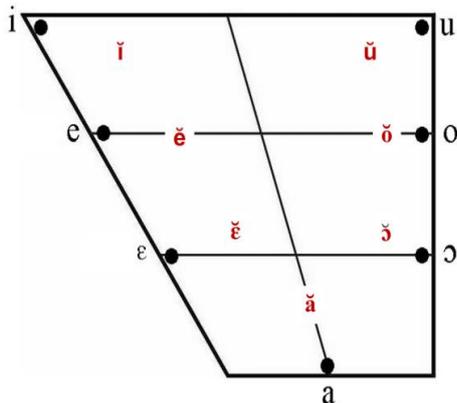
• בְּאֵר /bǝ'ʔer/ ('well')	~ בְּאֵר /be'ʔer/ ('explained')
• לְעַם /lǝ'ʔom/ ('to a nation')	~ לְעַם /le'ʔom/ ('to the nation')
• דָּמִי /dǝ'mi/ ('be silent')	~ דָּמִי /dǝ'mi/ ('my blood')
• רִי /s'ʔri/ ('medicine')	~ רִי /s'ʔri/ ('my enemy')
• עָנִי /ʔǝ'ni/ ('misery')	~ עָנִי /ʔǝ'ni/ ('you (f.) answer!')

Table 2b: Short vowels that contrast each other

• אֲנִי /ʔǝ'ni/ ('I, myself')	~ אֲנִי /ʔǝ'ni/ ('fleet')
• עָנִי /ʔǝ'nu/ ('you (p.) answer!')	~ עָנִי /ʔǝ'nu/ ('you (p.) sing!')
• עָלִי /ʔǝ'li/ ('you (f.) go up!')	~ עָלִי /ʔǝ'li/ ('pestle')
• דָּמִי /dǝ'mi/ ('I, myself')	~ דָּמִי /dǝ'mi/ ('you (f.) be silent!')
• חֲלִי /hǝ'li/ ('ornament')	~ חֲלִי /hǝ'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.

Figure 1: The double vowel system of the Tiberian Hebrew



4. INTRODUCING THE HEBREW TERM *SCHWA* INTO EUROPEAN LINGUISTICS

In the late 19th century the Hebrew term *schwa* was introduced into European linguistics by the German philologist Eduard Sievers. Sievers used this term for “the neutral vowel” in his descriptions, and this is the reason why we use until today the German spelling, “schwa” [10].

The symbol ⟨ə⟩ was used first by Johann Andreas Schmeller for the reduced vowel in his 1821 grammar of Bavarian German. He described specific properties of a particular dialect and needed a way to represent actual pronunciations; therefore he offered the ⟨ə⟩ symbol.

The phonetician Alexander John Ellis, in his phonetic alphabet (the palæotype alphabet), used ⟨ə⟩ for the similar English sound, and from there it found its way to the IPA charts (<https://en.wikipedia.org/wiki/Schwa>; https://en.wikipedia.org/wiki/Alexander_John_Ellis; [dictionary.com](https://en.wikipedia.org/wiki/Alexander_John_Ellis))

Before people started referring to ⟨ə⟩ as “schwa” in English (around 1895), it had many designations: The murmur vowel, the indeterminate vowel, the neutral vowel, the obscure vowel, and the natural vowel (Okrent, 20).

5. COMPARISONS BETWEEN THE TIBERIAN MOBILE SCHWA AND THE LINGUISTIC SCHWA

The Hebrew schwa and the linguistic schwa share a common name, but in some ways they are different and in some ways they share phonetic similarities:

- 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.

- The Tiberian schwa has seven different vowel qualities as described in Table 1, and they represent several phonemes, as can be seen in Table 2a&b. In contrast, the linguistic schwa is more centralized and usually does not represent more than one phoneme.

6. MISTAKES CAUSED BY THE USE OF THE COMMON "SCHWA" NAME

- Quite a few scholars were misled by the common name and mixed the Tiberian mobile schwa with the linguistic one: They wrongly transliterated the mobile schwa as “ə” (E.g. [11, 2, 17; 19]). As we have seen, the Tiberian scholars themselves declare that the quality of the Tiberian schwa is similar to one of their 7 vowels system.
- Sometimes the grammatical Modern Hebrew mobile schwa is also transliterated as [ə]. This too is a mistake, because the historical mobile schwa merged in Modern Hebrew with /e/ which is usually pronounced [e] or as zero, not as [ə]! The Academy of the Hebrew Language’s transliteration guidelines specify that the mobile schwa should be transliterated only if pronounced in Modern Hebrew, in which case “e” should be used for general purposes and “ẽ” for precise transliteration (Hebrew Language Academy, 2006: 4). Again, in Modern Hebrew the use of the symbol “ə” is misleading, because the phoneme /ə/ does not exist in Modern Hebrew.
- Chayen even claimed that the mobile schwa is a separate phoneme in Modern Hebrew (see [4]). He believed that the Modern Hebrew vowel system has 6 vowel phonemes. This is an error, because, as mentioned above, the historical mobile schwa merged in Modern Hebrew with /e/, and is usually realised as [e] or as zero. It has never been realised as [ə], neither in the *Tiberian vocalization* nor in Modern Hebrew (see also [12]).

7. REFERENCES

- [1] Bates S.A.R. 1995. *Towards a definition of schwa : an acoustic investigation of vowel reduction in English*, Doctoral, thesis in The University of Edinburgh (<https://www.era.lib.ed.ac.uk/handle/1842/15810?show=full>).
- [2] Bolozky S. 2005. “The role of casual speech in evaluating naturalness of phonological processes: the phonetic reality of the schwa in Israeli Hebrew”, *SKASE Journal of Theoretical Linguistics* (electronic publication). 2:3, 1-13.
- [3] Browman, C.P. & Goldstein L. 1992. “Targetless” schwa: An articulatory analysis. In Gerard J. Docherty & D. Robert Ladd (eds.) *Papers in laboratory phonology II: Gesture, segment, prosody*, Cambridge: Cambridge University Press, 26–56.

- [4] Chayen M.J. 1973. *The Phonetics of Modern Hebrew*, The Hague : Mouton.
- [5] Flemming E. 2007. *The Phonetics of Schwa Vowels*, Department of Linguistics & Philosophy, Unpublished ms. MIT (in: <http://web.mit.edu/flemming/www/paper/schwaphonetics.pdf>).
- [6] Hebrew Language Academy. 2006. *Transliteration Guidelines*. <http://hebrew-academy.huji.ac.il/hahlatot/TheTranscription/Documents/taatiq2007.pdf> (in Hebrew, p. 4)
- [7] Khan, G. 2013. *A Short Introduction to the Tiberian Masoretic Bible and its Reading Tradition* (2nd ed.), Piscataway, NJ: Gorgias.
- [8] Ladefoged P. and Johnson K. 2015. *A Course in Phonetics*, 6th edition, Michael Rosenberg, Cengage Learning.
- [9] Laufer, A. 2008. *Chapters in Phonetics and in Phonetic Transcription*, Magnes, Jerusalem, 185-186 (in Hebrew).
- [10] Liberman A. 2017. "Mid-June etymology gleanings", <https://blog.oup.com/2017/06/june-2017-etymology-gleanings/>.
- [11] Malone J.L. 1993. *Tiberian Hebrew Phonology*, Eisenbrauns, Winona Lake, Indiana.
- [12] Morag S. 1963. *Ha-Ivrit she-be-fi Yehude Teman* (Hebrew as pronounced by Yemenite Jews), Jerusalem: Academy of the Hebrew Language, (in Hebrew).
- [13] Morag S. 1972. Pronunciations of Hebrew, *Encyclopedia Judaica*, United States Macmillan Reference USA Imprint, vol. 13: 1120-1145.
- [14] Morag S. 2003. *Studies in Hebrew, Aramaic and Jewish Languages*, editors Bar-Asher, Breuer & Maman, Magness Press, Jerusalem (in Hebrew).
- [15] Okrent D. 2014. in <http://mentalfloss.com/article/56821/9-fun-facts-about-schwa>.
- [16] Pickett J.M. 1999. *The Acoustics of Speech Communication: Fundamentals*, Speech Perception - Theory and Technology, Boston.
- [17] Rendsburg G.A. 2013. Phonology: Biblical Hebrew, *Encyclopedia of Hebrew Language and Linguistics*. Edited by: Geoffrey Khan. Brill Online. Reference: <https://jewishstudies.rutgers.edu/docman/rendersburg/582-ehll-phonology-bh/file>.
- [18] Silverman D. 2011. "Schwa", *The Blackwell Companion to Phonology*. Edited by: van Oostendorp, Marc, Colin J. Ewen, Elizabeth Hume and Keren Rice, Blackwell Publishing.
- [19] Suchard B. 2018. The vocalic phonemes of Tiberian Hebrew, *Hebrew Studies* 59, 193-207.
- [20] Weninger S. 2011, *The Text of the Old Testament: An Introduction to the Biblia Hebraica*, Language Arts & Disciplines.