PHONETIC AND PHONEMIC ASPECTS OF ENGLISH NON-SYLLABIC VOCOIDS

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1.0. The traditional classification of speech-sounds, distinguishing two main groups, *vowels* and *consonants*, as first proposed by Greek and Roman scholars, was based on the function rather than on the phonetic nature of these sounds. Vowels were defined as those sounds which even in isolation could constitute a syllable, all other sounds being consonants. However, as through centuries the classical languages of Antiquity were deemed the sole worthy of attention by grammarians, one came to speak of vowels as those sounds which in Latin could constitute a syllable (*ā, ă, ē,* ĕ, etc.) and likewise as consonants those sounds that could not assume the syllabic function in Latin. Thus a shift of focus came about, establishing a one to one correspondence between phonetic and phonemic analysis for this one language.

When, however, one attempts to classify sounds in other than Latin languages according to such criteria, confusion is bound to arise. Thus, in Germanic languages sounds like [l] and [n], phonetically defined as consonants, in fact can and often do function as vowels, i.e., as syllable nuclei, e.g.

Eng. [bɔt̩l] "bottle"

Nor. [bünn̩] "bunnen" (i.e. "the bottom").

Hence "the emergence of compromise terms such as semi-vowel, demi-vowel, semi-consonant, vocalic consonant, consonantal vowel, vowel-like consonantoid, vocaloid, and others" (1) which hardly contribute to clarify the issue.

1 1. Given a clearcut distinction between the phonetic and phonemic levels of linguistic analysis, the apparent confusion appears

(1) — Abercrombie, D. — *Elements*, p. 79.

as due to defective terminology. The most adequate solution to this problem seems to be that proposed by Pike (2) With respect to their articulatory nature, sounds can be classified as *vocoids* or as *contoids*. Vocoids are sounds produced with a free central passage in the mouth-cavity, all other sounds being contoids (3) Functionnally, sounds (or rather *phonemes*) can be classified as *vowels* (*syllabics*) or as *consonants* (*non-syllabics*), the former being always V elements of the syllable structure, i.e., sounds capable of constituting a syllable unto themselves in the language in question, whilst the latter are always found in pre-syllabic or post-syllabic position within the syllable structure.

1.2. The above proposed definitions do not imply in any manner a constant correspondence between phonetic nature and phonemic function. This fact allows for a quadruple distinction:

i. syllabic vocoids, e.g. [e] in [fel] "fell"

ii. non-syllabic vocoids, e.g. [ŭ] in [ŭel] "well"

iii. syllabic contoids, e.g. [n̩] in [mitn̩] "mitten"

iv non-syllabic contoids, e.g. [b] in [bil] "bill"

In this paper it is our purpose to examine phonetic and phonemic aspects of non-syllabic vocoids in English, with special reference to British Received Pronunciation (4)

2.0. In English one finds voiced non-syllabic vocoids, exemplified by the initial sounds in "yes", "wood" and "road" as well as voiceless ones initially in e.g. "him", "how", "hatch" At this stage we will abstain from any premature phonemic interpretation, and operate simply with the following sound types: y-sounds, w-sounds, r-sounds and h-sounds.

2.1 The y-sounds are generally speaking articulated as unrounded voiced palatal vocoids. When preceding the syllabic, the speech-organs start at or near the position for the English short [i] and immediately leave this for some other sound of equal or greater

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(2). — Pike, K. L. — *Phonetics*, p. 78.

(3) — Acoustically, vocoids are sounds with clear formant structures and relatively high degree of intensity, the opposite being true for contoids.

(4). — For a definition of British R. P., see Jones, D. — *Dictionary*, p. XV-XVI, and Abercrombie, D. — *Problems*, Chap. IV

prominence (5) The following sound is generally a vocoid, but may on occasion be the contoid [l] in syllabic function, e.g. [ĭes] "yes", [ĭa: d] "yard", ['a: dĭəs] "arduous", [leĭbĭl̩] "labial" In stressed speech a slight friction is sometimes heard. In post-syllabic position no such friction occurs: [haĭ] "high", [noĭz] "noise" Note that "the actual sound used in particular words depends to some extent on the nature of the following or preceding vowel" (6) being sometimes as open as Cardinal Vowel nr. 2 [fɔĕa:dz] "four yards"

2.2. The w-sounds can phonetically be defined as voiced labio-velar vocoids. When an initial pre-syllabic, the speech-organs start in position for a variety of [u] with very close lip-rounding, but immediately leave this for some other vocoid position or, occasionally, for a contoid [l] in syllabic function. This movement, which by some authors is considered the main characteristic of w-sounds (but, in fact, any sound-sequence can be articulatorily described as a movement continuum) is termed an *onglide* (when post-syllabic, an *offglide*) Thus: [ŭil] "will", [ŭə] "were", ['ikŭl̩] "equal" (7) In stressed speech a slight friction is perceptible. When post-syllabic, if the syllabic vocoid is back (rounded or unrounded) the w-sounds will vary somewhat lips slightly less closed and rounded than in pre-syllabic position. With a preceding open unrounded syllabic the w-sound may be slightly more open (close to Cardinal Vowel nr 7) Thus, for instance: [koŭd] "code", [haŭs] "house" or even [haŏs] (8)

2.3 The so-called r-sounds in English cover a fairly vast articulatory range, from fricative alveolar (usually voiced) [r], to a mid-central unrounded vocoid [ə]. In most accents of England and North America — and in most environments — they are articulated as vocoids (9) In initial position one usually finds a voiced frictionless continuant, e.g. [ɹʌn] "run", being partially devoiced when preceded by a voiceless stop in the same syllable (10) In unstressed intervocalic position one often finds a "flapped" r-sound alternating freely with [ɹ], as in ['kɛri] or ['kɛɹi] "carry" The flap also occurs in initial clusters beginning with [θ]: [θri:] "three" In post-vocalic position, preceding a contoid or the final word-juncture, it will often be a retroflexed voiced mid-central vocoid, though in R.P one will more

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(5). — Jones, D. — *Outline*, § 813.
(6) — Jones, D. — *Outline*, § 814.
(7). — Jones, D. — *Outline*, § 802.
(8) — See also Trager and Smith — *English Structure*, p. 16-17
(9) — Abercrombie, D. — *Elements*, p. 80.
(10) — Jones, D. — *Outline*, § 748.

frequently encounter an unretroflexed vocoid, or merely a lengthening of the syllabic vocoid, e.g. [ðuə] or [ðu:] (11) Be as it may, in all pre-syllabic positions one can find a frictionless continuant and in all post-syllabic positions a mid-central vocoid, i.e., in either case we find some sort non-syllabic vocoid.

2.4. The h-sounds are usually described as being breathed glottal fricatives (12) There are, however, as many varieties of h-sounds as there vocoids, and the friction-feature is not always perceptible. Thus, as D. Jones admits (13), "h-sounds may be regarded as breathed (devoiced vowels, " These sounds occur only in pre-syllabic position.

3.0. In classifying sounds like [i], [u], [ə], [ɹ] and [h] as non-syllabic vocoids we have in fact presupposed a preliminary phonemic (functional) analysis excluding such sounds from the syllable base V

3.1. This point of view seems to hold in initial pre-syllabic position, where we find sequences of minimal pairs such as

[ŭɔt] "what"	[ŭɛl] "well"
[hɔt] "hot"	[hɛl] "hell"
[ɹɔt] "rot"	[ĭɛl] "yell"
[pɔt] "pot"	[sɛl] "sell"
[kɔt] "cot"	[tɛl] "tell"

in which vocoids [u], [h], [ɹ] and [i] pattern with contoids as non-syllabics. The h-sounds being always initial (within syllable structure), we can definitely admit it as a non-syllabic vocoid.

The y-sounds and w-sounds appear likewise in an inter-contoid environment, e.g.

['leĭbĭl̩] "labial" ['ikŭl̩] "equal"

which allows for the following phonemic interpretations:

/'ley-bil/	/'i-kul/
/'ley-byl̩/	/'i-kwl̩/
/'ley-byəl/	/'i-kwəl/

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(11). — Jones, D. — *Outline*, § 755.
(12). — Jones, D. — *Outline*, § 776.
(13). — Jones, D. — *Outline*, § 777 See also Abercrombie, D. — *Elements*, p. 80.

The first alternative may be discarded on grounds of prominence.

Furthermore, sequences such as [kŭl] and [bĭl] appear only in unstressed syllables, alternating freely with [kŭəl] and [bĭəl]. It would therefore seem more convenient to state that a phoneme /ə/ in unstressed position preceded by a stop + non-syllabic vocoid sequence and followed by a lateral may be omitted in the phonetic realization. We will therefore adopt the third alternative and maintain our interpretation of [i] and [u] in the quoted examples as non-syllabic vocoids.

In pre-syllabic non-initial position we find [i], [u], and [ɹ] patterning as follows:

[kɹouk] "croak" [fĭu] "few" [tŭeĭn] "twain"

[klouk] "cloak" [flu] "flue" [tɹeĭn] "train"

i.e., as second members of initial contoid clusters.

Thus, we are justified in stating that in initial (i.e. pre-syllabic) position are to be found the phonemes /y/, /w/, /r/ and /h/ all of which will be phonetically manifested by non-syllabic vocoids, respectively [i], [u], [ɹ], and [h] (main allophones)

3.2. In what we have called post-syllabic position we find [i] and [u] while [ɹ] alternates freely with [ə] and [:]. We are here confronted with a series of problems more or less interconnected, but which may be treated separately under the following headings:
a-is length phonemically relevant in English?
b- are there phonemic diphtongs in English, i.e., does the V element in Engish syllable structure admit more than one vocalic phoneme?
c- are [ɹ], [ə] and [:] allophones of one and same phoneme and if so of which (/r/, /ə/ or /h/)?

3.2.1 According to D. Jones (14), five English vocoids can be described as long, being in opposition to similar short ones:

[i:]	[fi: l]	"feel"
[i]	[fil]	"fill"
[a:]	[ba: d]	"bard"
[ɛ]	[bɛd]	"bard"

(14). — Jones, D. — *Outline,* Chap. XIV

[ɔ:]	[kɔ: d]	"cord"
[ɔ]	[kɔd]	"cod"
[u:]	[fu: l]	"fool"
[u]	[ful]	"full'
[ə:]	[bə: d]	"bird"
[ə]	[bət]	"but" (weak form)

Though this interpretation certainly offers a simple and neat descriptive statement, it is suggested that as far as native speakers are concerned, quality, not quantity, is the main distinctive feature (15) One possible solution which takes into account this fact without giving up the attempt to obtain a simple description would be that which considers length and quality to be conditioned by environment (16) Thus, it will be noted for the mid-central syllabic vocoids that [ə] is common before voiceless stops and in unstressed position, that stressed [ə] is to be encountered in an environment which, as will be seen further on, leads us to presuppose a conditioning post-syllabic /r/ phoneme, while [ʌ] is normally found elsewhere.

The opposition [i:]/[i] and [u:]/[u] can be explained in terms of sound quality and place of articulation, the "short" sounds being somewhat more open and centralized. Here again, however, one may refer to environment. Indeed, [i:] is actually [iĭ] and [u:] in narrow notation should be represented as [uŭ] The sound quality distinction between the "sohrt" and the "long" closed vocoids may therefore be said to be dependent on the presence of the phonetically similar non-syllabic vocoids, [i] and [u] respectively

The pair that Jones transcribes as [ɔ:]/[ɔ] in narrower notation would be represented as [o:]/[ɔ]. The [ɔ]-sound is always short, and found preceding stops, e.g. [kɔd] "cod", while [o:] will be found preceding what we have temporarily classified as r-sounds, e.g. [ko:ɹd], [ko:d] or [kəd] "cord". Finally, a very close [o] occurs preceding[u], as in [koŭl] "coal" Thus, [ɔ], [o:] and [o] may all be considered as allophones of one phoneme /o/, length and sound quality variations being conditioned by environment.

The pair [a:]/[ɛ] seems to be only one which will not allow for a reduction to a single phoneme */a/ It is true that a post-syllabic r-sound seems to condition the presence of [a:] as in [ka:] "car", excluding the possibility of an [ɛ]-sound appearing, but the existence of sequences such as ['fa:ðə] "father" leads us to assume that at least in R. P [ɛ] is an independent phoneme with a slightly

(15). — Gimson, A. C. — *Implications*.
(16). — See Trager and Smith — *English Structure*, Chap. I.

defective distribution. The length feature is nevertheless secondary, sound-quality being all-important to assure the distinction.

Note that an alternative and usually accepted interpretation for [i:] and [u:] is that of "complex vowel phonemes", in which case one is obliged to maintain a phonemic distinction between /i:/ and /i/ and between /u:/ and /u/, since no room is left for a conditioning non-syllabic vocoid. According to this point of view, the [i] and [u] elements in [eĭ] and [oŭ] are likewise to be understood as part of a complex vowel, thus receiving no independent notation (17)

> From the preceding discussion one can assume that length is not phonemically relevant in English. In many instances, however, this presupposes that the so-called r-sounds — including a not infrequent length-feature — are in post-syllabic position recognized as members of a non-syllabic phoneme. Though this seems very likely, we can at this stage have no certainty, and the exclusion of length from the phonemic description of English is to be considered merely as a hypothesis, though a strong one.

3.2.2. The probable exclusion of length as a phonemic feature of English still leaves us with two alternative descriptive possibilities for sequences such as [aĭ], [aŭ] etc. Indeed, these can be interpreted as clusters (diphtongs), i.e., as a V element of syllable structure, or as a sequence V + C. The choice is of great importance inasmuch as the first interpretation would preclude any identification of [-u], [-i] and [-ɹ]/[ə]/[-:] as positional allophones of the /y/, /w/ and /r/ phonemes — as the second alternative would imply — but rather, through functional identification, would lead us to consider them as positional allophones of the /i/, /u/ and /ə/ syllabic phonemes.

A close observation of English syllable structure leads one to the conviction that only rarely do syllabic vocoids appear in open syllables. In fact, with a few exceptions such as [ə] in unstressed [ðə] "the" and [i] in unstressed final position as in [hɛpi] "happy" the dominating patterns seem to be

V + C	[ɛm]	"am"
C + V + C	[put]	"put"
C + C + V + C	[stik]	"stick"
V + C + C	[ask]	"ask"
C + V + C + C	[kalm]	"calm"
C + C + V + C + C	[tɹɛkt]	"tract"

(17). — Steinberg, M. — *Vogais*.

etc (18) This being the case, one is justified in interpreting the syllabic + non-syllabic vocoid sequences as V + C and identify post-syllabic [u] and [i] as allophones of /w/ and /y/ respectively The r-sounds, however, demand further discussion.

3.2.3. The proposed problem is whether [ɹ], [ə], and [:] are allophones of one and same phoneme, and if so which.

To the first part of the problem the elements so far examined lead us to answer in the affirmative, the sounds in question being found in free variation in the same environment. Apparently, [:] is a rather curious allophone unless one admits that a segmental phoneme may at times have a suprasegmental realization. This is indeed what occurs with the final nasal non-syllabic phoneme in Portuguese, which in certain contexts appears as a suprasegmental nasality inciding on the syllabic vocoid. As to the question to which phoneme these sounds belong, we are confronted with three possibilities: /h/, /ə/ or /r/

To ascribe the said sounds to the phoneme /h/ would be a fairly reasonable proposition in terms of distribution, but certainly not with respect to their phonetic nature: in [ɹ], [ə], or [:] there is no devoicing of vocoid sounds, no breathed friction, and the main articulations are made in the mouth-cavity Nor can we agree with Trager and Smith's analysis of h-sounds as glides, which would bring them closer phonetically (19)

On purely phonetical grounds, the most natural solution would be to identify these sounds with the /ə/ phoneme. However, in our preceding analysis we have discarded the possibility of a V + V sequence within the English syllable structure. Further, through we have first and foremost proposed ourselves the description and interpretation of data from British R. P., a solution which could be applied to English in general would be of greater descriptive value. It is a known fact that in many dialects, and in American English, [ɹ], [ə] and [:] with the /r/ phoneme provides us with the neatest and the most practical solution to the problem.

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(18). — See Fries, Ch. C. — *Teaching and Learning English,* p. 12. The author's exemplification shows in all instances except for [i] and [ə] a V + C sequence. Note that in accordance with the "complex vowel" interpretation, Fries transcribes "way" and "Mexico" as /we/ and /meksiko/ respectively, while according to our suggestion the phonemic representation for these sequences would be /wey/ and /meksikow/

(19). — Trager and Smith, *English Structure,* p. 21.

4.0. We can now sate the phonemic/phonetic correspondence rules for the English non-syllabic vocoids.

4.1 The phoneme /h/ appears only in pre-syllabic position, being realized as a devoiced vocoid.

4.2. The phoneme /r/ will occur as [ɹ] in pre-syllabic position, [r] being a free variant after [θ] and in intervocalic environment. In post-vocalic position there is free variation between [ɹ], [ə] and [:]

4.3. The phoneme /y/ is employed both in pre-syllabic and in post-syllabic position, usually as [i], though the exact degree of aperture is conditioned by that of the syllabic vocoid. In stressed speech an allophone [y] is sometimes heard.

4.4. The phoneme /w/ is found in pre-syllabic and in post-syllabic position, usually as [u] though here again the degree of aperture is conditioned by environment. In stressed speech the pre-syllabic allophone is sometimes [w] (slight friction)

BIBLIOGRAPHY

ABERCROMBIE, D. — *Elements of General Phonetics*. Edinburgh, Edinburgh University Press, 1967

ABERCROMBIE, D. — *Problems and Principles in Language Study*. Longmans, 1956.

FRIES, Ch. C. — *Teaching and Learning English as a Foreign Language*. Ann Arbor, The University of Michigan Press. 21st printing, 1967.

GIMSON, A. C. — *Implications of the phonemic/chronemic groupings of English vowels,* in *Phonetics in Linguistics. A Book of Readings,* ed. by Jones, W E. and Laver, J., Longmans, 1973.

JONES, D. — *Outline of English Phonetics*. Cambridge, Heffer, 1967.

JONES, D. — *English Pronouncing Dictionary* Dent & Sons, 12th edition, 1964.

PIKE, K. L. — *Phonetics*. Ann Arbor, The University of Michigan Press, 12th printing, 1969.

STEINBERG, M. — *Vogais complexas e ditongos*. Unpublished paper, São Paulo, 1968.

TRAGER, G. L. and SMITH, H. L. — *An Outline of English Structure*. Oklahoma, Norman, 1951.