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■ BASIS OF ARTICULATION AND THE PHONETICS-PHONOLOGY INTERFACE

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U radu se donosi pregled različitih pristupa artikulacionoj bazi u fonetskoj literaturi, s fokusom na njeno razumevanje u slovenskoj lingvistici i prethodnim istraživanjima autorâ (e.g., Kašić 1998, 2000; Božović 2016, 2020). Ističe se kako je shvatanje artikulacione baze evoluiralo od "skupa artikulacionih navika" ka "sistemu artikulacionih navika", povezujući tako fiziološku osnovu govora s fonološkim sistemom jezika, te time pružajući mogućnost i za bolje razumevanje fonetsko-fonološkog interfejsa.

Ključne reči: artikulaciona baza, slog, fonetsko-fonološki interfejs.

1. INTRODUCTION

"And the Gileadites took the passages of Jordan before the Ephraimites: and it was so, that when those Ephraimites which were escaped said, Let me go over; that the men of Gilead said unto him, Art thou an Ephraimite? If he said, Nay; Then said they unto him, Say now *Shibboleth*: and he said *Sibboleth*: for he could not frame to pronounce it right. Then they took him, and slew him at the passages of Jordan: and there fell at that time of the Ephraimites forty and two thousand."
Judges 12:5-6 (KJV)

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That speakers of different languages or dialects typically may have differing pronunciation habits is a long-observed phenomenon. With the advent of modern phonetics, this phenomenon was conceptually framed and termed as the ‘basis of articulation’ or ‘articulatory setting’. Despite its intuitiveness, however, no phonetic research has succeeded in describing this pretheoretical notion scientifically, or even proving its existence, at least not conclusively—perhaps due to the overall complexity of the process of articulation itself. Without a solid empirical grounding, ‘articulatory base’ as a concept has acquired various definitions in the phonetic and phonological literature over time, and infamously became a rather vague and “somewhat nebulous term” (Kelz 1971: 193).³

‘Articulatory setting’ or ‘basis of articulation’ can be broadly defined as *language-specific manner of articulation*. What exactly constitutes this specificity is poorly understood, however. On the one hand, it was postulated that there exists a language-specific ‘default’ or ‘baseline’ (neutral) position of the speech organs, prior to the moment of speaking, as they prepare to engage in the production of speech:

Starting position (= resting position) of the articulators in the articulation of a speech sound; [...] a particular state of vocal organs [...] in the speech ready mode, and [...] a particular position of the tongue [...] which [...] was maintained throughout speech in between articulations and in pauses. (Borissoff 2012: 9)

On the other hand, ‘basis of articulation’ has been described as the sum of *all* speech habits in a language, which constitute the native speakers’ *typical* pronunciation, i.e. all the language-specific typical (habitual) positions of the speech organs when put into action, or as Malmberg puts it, “a convenient, but not strictly scientific label for all the articulatory habits which characterise a language” (Malmberg 1963: 71). In Honikman’s words, ‘basis of articulation’ represents:

the disposition of the parts of the speech mechanism and their composite action; [...] the overall arrangement and manoeuvring of the speech organs necessary for the facile accomplishment of natural utterance. (Honikman 1964: 73)

These are rather different notions, even with different genealogies (cf. Borissoff 2012; Kedrova/Borissoff 2013), encompassing a huge space virtually from *everything* (the sum of *all* articulatory habits) to *nothing*—from the position of speech organs when ready to speak, i.e. the *moment before* speaking; to the ‘static’, resting position of speech organs, i.e. when *not* speaking (in pauses). Yet, there is a clear physical link between all these phases, and it is often very hard or practically impossible to demarcate them in the process of articulation. This is why the impression of an ‘articulatory basis’, whatever its real nature, still persists.

And as such, something like ‘basis of articulation’ clearly has its effects, e.g. in coarticulation patterns and consequently, diachronic sound change (cf. Borissoff 2012’s window metaphor), in ‘foreign accent’ and similar phenomena (this often surfaces

3 For a more detailed history of the notion, see also Laver (1978) and Jenner (2001).

in research on L2 acquisition and pronunciation teaching or in forensic speaker identification tasks), as well as in phonetics-phonology interface (cf., e.g., Drachman 1973 for an early account), which is also the main topic of this paper.

Main goals of this paper are twofold: 1) to present an overview of the notion, with a focus on its understanding in Slavic linguistics and our own research (e.g., Kašić 1998, 2000; Božović 2016, 2020); and 2) to give a theoretical examination of the notion, linking the physiological basis of speech with the phonological system of a language, thus providing a window for a better understanding of the phonetics-phonology interface.

2. BASIS OF ARTICULATION IN SLAVIC STRUCTURAL PHONOLOGY AND PHONETICS

As Kedrova & Borissoff (2013), who give a detailed overview of the notion in Russian linguistics, point out, rather than as a static posture or 'baseline', basis of articulation was very early on in the works of Slavic phoneticians understood from a dynamic and functional perspective. Influenced by key figures in late 19th and early 20th-century Slavic phonetics and phonology, such as Baudoin de Courtenay and Lev Ščerba, basis of articulation in the Slavic tradition was essentially linked with structural (phonological) and typological aspects of the speech production:

Starting from Baudoin de Courtenay and Tomson, Russian linguists tended to view the articulatory base in a wider phonological framework. They aimed not only to describe it but also to explain certain processes and to highlight the causative-consequential relations which would give the concept the power of predictability. (Kedrova/Borissoff 2013: 187)

At the same time, this meant in essence that articulatory basis was redefined so as to avoid a somewhat vague holistic 'sum' of all articulatory movements a speaker may produce, but rather was viewed as the "'summation' of certain specific salient 'features' or 'peculiarities' distinguishing phonetic systems of different languages" and "a set of dynamic articulatory features or, more abstractly, of articulatory 'tendencies' or 'general direction of movements'", that speakers of specific languages or dialects *typically* manifest (Kedrova/Borissoff 2013: 186).

A parallel evolution may be observed in Serbo-Croatian phonetics, as well. The traditional notion of a basic 'neutral position' still persisted in the works of the first generation of Serbian phoneticians. Miletić thus defines articulation basis as "the deeply rooted habits that are caused by a certain basic position of speech organs" (Miletić 1952: 103). After the influx of structuralism with the younger generation of linguists in the 1960s, the idea emerged that articulatory basis is a more dynamic notion which is reflected in "certain specific salient 'features' or 'peculiarities'". The main definition given in *An Encyclopedic Lexicon of the Serbo-Croatian Language* is thus "the summation of articulatory features that characterise the production of words in a specific language" (Peco/Stanojčić 1972, 1: 40). It then proceeds to include the

traditional resting position of speech organs in pauses, too, but only to immediately return to the “sum of articulatory movements which characterise a language”.

This development is implicitly summarised in Bugarski’s textbook *Introduction to General Linguistics*, where the ‘neutral position’ is entirely omitted and the basis of articulation is defined (not within phonetics, but in the chapter on phonology!) as “a set of habits to spontaneously produce sounds of a particular, and not any other language” (Bugarski 2003: 125). The following context is given for this definition:

In that way, all languages have different phonological systems, and the distinctions that are found in the basis of each of them must be independently mastered in the course of first language acquisition in childhood or when learning other languages later in life. (Bugarski 2003: 125)

What all these definitions delineate are, in fact, different structural properties of speech as such. Three types of those ‘design features’ may be distinguished.⁴ Namely, natural speech has a *physiological basis* in specific articulatory movements of the vocal tract, it is *structured*, and its working is *spontaneous*. Exactly these features are the defining traits of a basis of articulation in particular languages and dialects, too.

The first type of features that define an articulatory basis concerns *specific positions and general movements of speech organs* (i.e. the physiological basis of language-specific speech production). This is reflected in the “articulatory ‘tendencies’ or ‘general direction of movements’”, “the summation of articulatory features” and the “sum of articulatory movements” that gives the impression of a language-specific articulatory basis.

The second type of features, however, concerns their *systemic* character: they are used in the “production of words” (utterances), “to produce sounds” etc., which is to say, they are “characteristics of phonetic systems” and are constrained by them. In other words, they are *language or dialect specific* (a social rather than a biological fact): they “characterise a language”, “a particular, and not any other language”.

Finally, the third type of properties that define basis of articulation are habituality and spontaneity. Native speakers’ natural production is characterised by largely “spontaneous” and “deeply rooted habits”. This means they are *spontaneously acquired* and *automated* in the course of language acquisition, which also means they are largely subconscious (although often perceptually salient for speakers of other languages or dialects).

These ‘design features’ served as the basis for our operational definition of articulatory base: it is *the system of native speakers’ automated articulatory habits* (cf. Kašić 1998; Božović 2016). This definition highlights two important structural properties of the articulation base, which were not particularly emphasised in the previous literature on the topic: it is a *system* (not merely a ‘set’ or ‘sum’) of speech habits, and these habits (i.e., articulatory movements) are *automated* in native speakers’ natural production.

4 Kašić originally distinguished seven types of the key properties of articulation basis, on which she based the definition we will give later in the text. Her seven kinds of features are summarized here in three more general types.

Conceiving articulation basis as an *automated system* of articulatory movements ('features' or 'tendencies') makes it practically equivalent to the phonological system of a language, or more precisely, its material realization. This is why articulation basis typically characterises all members of a speech community, it is perceptually salient in their speech and because of it being automated, it is hard to change when speaking in another language. But this is also why, at the same time, efforts to physically record its existence, to measure it somehow and to 'pin it down', failed to produce conclusive results—it is not any particular position of speech organs that may be said to characterise a French or a German or an English speaker, or a speaker from Manchester, etc., but rather their systemic behaviour in the overall articulatory process when speaking in a particular language or dialect.

In other words, what gets automated in the course of acquisition of an articulatory basis are, of course, not individual sounds (i.e. specific postures of the vocal tract) or isolated articulatory movements. Rather, because syllables are in fact minimal units of articulation (cf. Kašić 2000; the idea goes back at least to Jakobson), it is the pronunciation of syllables as *structured* articulatory units that which represents the locus of this automated system of speech habits. This means that the basis of articulation actually reflects language-specific rules of syllable structure, their internal makeup and functioning, both in terms of phonetics and of phonology.

For example, in Serbo-Croatian, sonorants can be syllabic under certain conditions (e.g. *krv* 'blood', *prst* 'finger', *bi.ci.kl* 'bicycle'), so that speakers of this language may easily produce complex clusters of consonants in onsets and nuclei, not found in languages which lack this structural feature. This is a characteristic of Serbo-Croatian articulatory basis. On the other hand, Serbo-Croatian generally avoids complex codas, lacks palatalized / non-palatalized distinction in consonants (as found, e.g. in Russian), lacks uvular or pharyngeal realizations in its phonetic inventory—not because speakers of Serbo-Croatian are not accustomed to producing them in isolation or as facultative phonetic variants, but because they are not found in actual phonotactically well-formed sequences in Serbo-Croatian words, so that they are not typical, habitual and spontaneous realizations these speakers would most frequently and naturally produce in the appropriate phonetic *contexts*, as speakers of some other languages would do, etc. So, when saying, e.g. that Serbo-Croatian articulatory basis is 'fronted', we are actually stating something about the syllable structure or phonotactics of Serbo-Croatian, only in materialized, articulatory terms (= i.e. Honikman's "manoeuvring of the speech organs", in order to articulate syllables which have the phonological structure of Serbo-Croatian, "and not any other language").

In other words, it is both phonetics and phonology that get automated in the process of speech acquisition, which is why, e.g. L2 learners may find it difficult to master native-like pronunciation.⁵ This is the effect of the basis of articulation's systemic character, which is reflected in language-specific production and organization of syllables in the speech chain. Automating the pronunciation of syllables as minimal structured units and minimal units of articulation creates the appropriate conditions

5 This echoes Trubetzkoy's notion of *accentual filter* or "phonological sieve" (*crible phonologique*), on which, in the context of articulatory basis, see also Gudurić (2009).

for automating the exact “articulatory ‘peculiarities’” of individual speech segments, too, which are themselves contained within syllables as minimal articulatory units. It also allows for automating the production of certain specific suprasegmental characteristics of speech, such as the typical utterance rate or prosodic features, which are also characteristic of a particular basis of articulation (cf. e.g., Božović 2020). This is schematically illustrated in Figure 1.

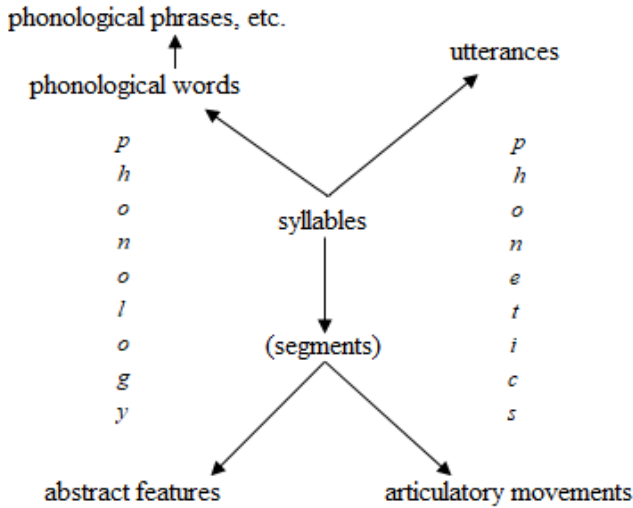


Figure 1. The production and organization of syllables in phonetics and phonology

Such theoretically informed conception of articulatory basis, which has its roots in Slavic proto-structuralist and structuralist tradition in linguistics, not only provided valuable explanatory mechanisms in phonetic and phonological research, and in the study of speech in general, that the traditional pretheoretical notion lacked, e.g. in dialectology (Božović 2020) or in studies on language contact (on which cf. Božović 2016), but also became an indispensable tool in a range of applied disciplines, such as pronunciation teaching or forensic speaker identification tasks (Kašić/Đorđević 2009). In addition, it may shed new light on other theoretically interesting phenomena, such as the nature of the phonetics-phonology interface.

3. PHONETICS-PHONOLOGY INTERFACE

We saw that it is the production and organization of syllables, not of individual sounds or features, that which links phonological structure with a language-specific articulation basis, i.e. its material realization. Being minimal structured articulatory units, syllables and their production in the speech chain are in fact the universal locus of the “summation” of all specific articulatory and prosodic properties that define a particular basis of articulation and natural speech in general. At the same time, their

structural (segmental or featural) makeup and organization within larger structural units depend on phonotactic rules or constraints and thus belong to the computational domain of phonology, not the physical-realizational domain of phonetics.

This brings up the question of the exact nature of the phonetics-phonology interface, yet another controversial and much debated topic:

The expression ‘phonetics-phonology interface’ (PPI) is subject to about as many imaginative interpretations as there are variants of the (in)famous “light bulb” jokes. Even though there are only three words in the expression, there are more than 3³ interpretations and opinions about its meaning, its reality, its implications for theoretical and practical treatments of speech. (Ohala 2003: 277)

There are various positions on PPI in the literature:

The number and depth of these interfaces [i.e., between phonetics and phonology] is so great that one is naturally moved to ask how autonomous phonetics and phonology are from one another and whether one can be largely reduced to the other. The answers to these questions in the current literature could not differ more. At one extreme, Ohala (1990) argues that there is in fact no interface between phonetics and phonology because the latter can largely if not completely be reduced to the former. At the opposite extreme, Hale & Reiss (2000) argue for excluding phonetics entirely from phonology because the latter is about computation, while the former is about something else. Between these extremes are a large variety of other answers to these questions. (Kingston 2007: 401)

Rather than trying to reduce phonology to phonetics or vice versa, or to delimitate and divorce the two entirely, it may be argued that the interplay of articulatory basis and syllable structure shows that there is in fact a *mutual conditioning* of the two. Namely, both phonetics and phonology constrain sound patterns of a language at the level of syllables (as minimal units of articulation that get automated early in the process of L1 acquisition, and as structural representations), and so both constrain one another.

On the one hand, phonology is about computation, but what *may* be computed in a particular language? Phonology (phonotactics) has to operate on actual combinations of segments (or features⁶), that correspond to articulatory habits of a speech community. This is how phonetics (i.e. language-specific articulatory basis) constrains phonology.

Phonetics, on the other hand, is constrained by phonology in that actual combinations of segments that get realized are structurally conditioned and organized into units (syllables) by phonotactic rules. This is how both the computational and the physical-realizational domains interact at the level of production and organization of syllables. Of course, there are still other aspects of both phonetics and phonology that are largely independent of one another, but it is the production and organization of

6 Note that features are also defined by phonetics. Whether acoustic or articulatory, features always have their material realization in the particular properties of speech signal or in concrete articulatory movements of speech organs.

syllables, as minimal structured articulatory units, that which may be said to constitute the locus of PPI, linking the physiological basis of speech with the phonological system of a language.

Syllables are then broken into smaller segments, on which phonetics and phonology may operate independently, as well as organized into larger units (including the suprasegmental level); as is shown in Figure 1 above. But these are all interconnected only via syllabic structure, and it is precisely here that the concept of basis of articulation emerges as a connecting tissue between phonetics and phonology. Again, this is, very roughly, indeed—without much theoretical pretension, but for the sake of illustration only—schematized in Figure 2.

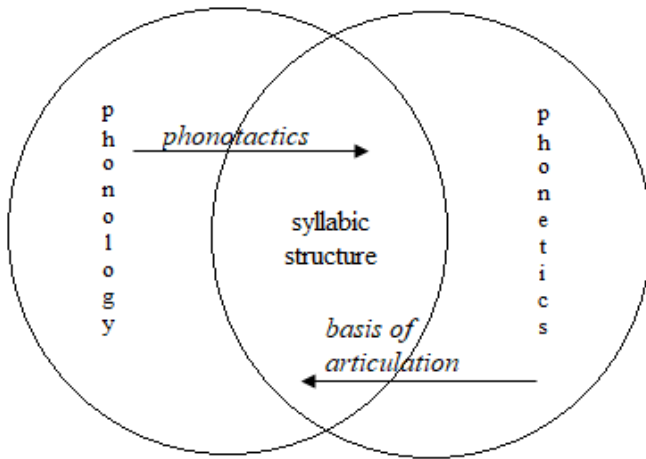


Figure 2. Syllabic structure as the locus of phonetics-phonology interface

4. CONCLUSION

For the concept of basis of articulation, this is good news. It means that this rather vague and “not strictly scientific” notion (albeit a quite useful one, e.g. in applied phonetics or in research on language contact) could be successfully redefined so as to gain a more solid and realistic grounding. At the same time, it can shed new light on other phenomena of theoretical and practical significance, such as the nature of the phonetics-phonology interface.

This is also an example of a productive interchange between various traditions of linguistic thought. As a concept initially defined in German and English phonetics (by Sweet, Sievers, Viëtor, Jespersen etc.), basis of articulation has benefited greatly from insights in Slavic structural phonology and phonetics and was successfully applied in a variety of research studies.

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SUMMARY

BASIS OF ARTICULATION AND THE PHONETICS-PHONOLOGY INTERFACE

The notion of *articulatory basis* or *setting* has acquired very diverse definitions and interpretations over the course of history of phonetic research, in various schools of phonetics and phonology, or even with different authors (see, e.g. Laver 1978; Jenner 2001). For some, it is even questionable if 'basis of articulation' actually exists. For others, however, it is an indispensable tool for explaining various phonetic and phonological phenomena, including their application in a number of professional domains, e.g. from second language teaching to forensic speaker identification.

In this paper, we present a review of different approaches to basis of articulation in phonetic literature, with a focus on its understanding in Slavic linguistics (cf. also Kedrova/Borissoff 2013) and our own research (e.g., Kašić 1998, 2000; Božović 2016, 2020). In particular, we show how the understanding of basis of articulation has evolved from the “*sum* of speech habits” to the “*system* of speech habits”, thus linking the physiological basis of speech with the phonological system of a language and providing a window for a better understanding of the phonetics-phonology interface.

KEYWORDS: basis of articulation, syllable, phonetics-phonology interface.

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