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The Tongue in the Oral Cavity: Resting Position, Inter-Speech Posture and Tongue Bracing*

ABSTRACT

The tongue in the oral cavity can be defined in various contexts. Three of its activities are described in this article: resting position, inter-speech posture and tongue bracing and their relations to the primary functions of the orofacial complex are indicated. The tongue bracing was a special subject due to the fact that it has not yet been described in the Polish linguistics literature. The results of the study concerning Polish speech with the use of the instrumental method were also included.

Keywords: resting position (RP), inter-speech posture (IsP) tongue bracing (TB), speech, articulation

INTRODUCTION

Language is a product and form of conceptual thinking and a tool of communication (Panasiuk, 2018). Internal speech therefore serves cognitive processes while external speech enables linguistic communication (Kuczkowski, 2018). Production of utterances is the planned and organized sound sequences whose meaning, after they have been distinguished and combined into words, phrases,

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and sentences, is identified by the listener's mind (Kaczmarek, 2000; Kuczkowski, 2018; Pluta-Wojciechowska, Sambor, 2017).

A sound (phone) is the smallest element of the sonic form of utterance, a physical representation of a phoneme, consisting of a set of specific articulatory, acoustic and auditory characteristics. A sound is produced by a set of configurations and movements of the speech organs based on the activation of its neurophysiological pattern (Pluta-Wojciechowska, 2007).

Pluta-Wojciechowska defines the criteria for describing phones (sounds), or actually basic sounds that conform to the adopted phonological-phonetic system (Pluta-Wojciechowska, 2007). These are: (1) location in the sense of the main place of articulation (2) modality in the meaning of the manner of articulation, (3) resonance understood as the participation of the nasal resonator, and (4) sonance – the participation of the vocal cords (Pluta-Wojciechowska, 2006; Pluta-Wojciechowska, 2007; Pluta-Wojciechowska, 2019). These criteria, which Pluta-Wojciechowska calls "dimensions", make it possible to identify, distinguish from others, and characterize basic consonants (Pluta-Wojciechowska, 2007).

Behind the phonetic features of individual sounds are specific settings, positions and movements of the speech organs, particularly of the tongue, whose shape and positioning in a particular place determines the shape, location and size of the emerging constrictions (Pluta-Wojciechowska, Sambor, 2017). These settings, positions and movements are connected with the position of the tongue in the oral cavity while at rest and while executing various actions. Below will be described three phenomena related to the position of the tongue in the oral cavity: resting position, inter-speech posture, and tongue bracing.

RESTING POSITION (RP)

The tongue's resting position is one that the tongue assumes at rest, i.e. during free breathing. Breathing is one of the primary functions of the orofacial complex, necessary for maintaining vital functions. This position is significantly influenced by the breathing pattern, and the accompanying tonus and work of muscles determine the position of the lips, mandible, tongue and cheeks, as well as the head and neck; the connections with the tonus and work of the body muscles located in the distant area, including the respiratory ones, are also highlighted (Łuszczuk, 2012; Łuszczuk, 2017).

The tongue's resting position is "the verticalization of the wide tongue in the oral cavity, during which the tongue, on the one hand, is elevated, its tip touching the region behind the necks of the upper incisors, with the dorsal part adhering to the palate, while on the other hand it assumes a broad shape. The front part of the tongue assumes a horizontal position, its tip being pointed toward the palatal

part of the upper teeth" (Pluta-Wojciechowska, 2013: 309). Pluta-Wojciechowska calls this position "vertical-horizontal", which means the vertical elevation of the tongue, or the so-called verticalization, while the horizontal position of its front part is maintained, she also shows different variants of this position (Pluta-Wojciechowska, 2013). The connection between the occurrence of the abnormal resting position of the tongue and the non-normative realization of phonemes is shown by the studies by Sambor (2014/2015). The tongue's resting position is also related to the resting position of the mandible, and with anatomic-functional conditions, including the process of swallowing and the tongue's swallowing position (Sambor, 2014/2015) and the course of other primary functions within the area of the orofacial complex (Pluta-Wojciechowska, 2013).

"In the phylogenetic development, speech emerges due to the gradual integration and coordination of different morphological-functional complexes, from receptors constituting input channels of information to effectors transmitting information through the peripheral speech organ with the participation of the vocal organ" (Obrębowski, 2018: 23; cf. Obrębowski, 2005). Of extreme importance for the resting position is the progression of primary functions (Łuszczuk, 2012; Łuszczuk, 2017; Pluta-Wojciechowska, 2013; Stecko, 2002). Changes in the process of the child's development, related to the work of the orofacial complex muscles, connected with the improvement and changes in the way of execution of primary functions, are extremely significant to molding the tongue's motor skills indispensable for the normative development of phonetic skills, especially for the articulation of dentalized sounds and [r] (Pluta-Wojciechowska, 2017). As a result of this improvement, the organs that initially participate only in eating, drinking and breathing became speech organs (Pluta-Wojciechowska, 2013). On the one hand, the prototypic orofacial experiences relating to prenatal and early postnatal experiences are the biomechanical base for articulation and it is on them that its quality largely depends (Pluta-Wojciechowska, 2013). On the other hand, the morphological-functional balance connected with the normal development of the course of primary functions, including the position of the lips and tongue, as well as the mandible and cheeks, is a condition for the regular growth and development of the structures of the orofacial complex (Łuszczuk, 2012; Łuszczuk, 2017). It is essential insofar as the location with respect to the place of articulation is the point where two elements come into contact or come close to each other (Łuszczuk, 2012; Łuszczuk, 2018); consequently, not only the position, posture and the shape of the tongue[1] will be significant to the location of this point, but also the size, shape and dimensions of the space in which the tongue is situated

[1] The discussion in the present paper concerns the tongue's resting position, which is why attention is focused here. The location concerning labial or labiodental sounds will also cover two points but situated outside the tongue (author's note).

(Pluta-Wojciechowska, 2007), both at rest and in the course of execution of various activities. Equally significant will be the ratio of the size of this space to the tongue size (Łuszczuk, 2018). Lorenc, referring to Hamann (2003), points to the active and passive articulator (Lorenc, 2016); the role of the "box", in which the tongue moves, and the "architecture of the palate" are highlighted also by Pluta-Wojciechowska (2013). The size, shape and proportions of the three dimensions of this space will depend on the course of primary functions while these parameters will be crucial to the location of the tongue at resting position.

Konopska has found that undesirable articulation features can be found depending on the structural conditions (Konopska, 2006). Compensatory strategies, visible as defective phonetic features of the produced speech sounds, are proof that there are certain difficulties in achieving normative features when realizing a given phoneme (Pluta-Wojciechowska, 2007). What is essential, however, is that "the adopted compensatory strategies used in articulation do not appear in the patient's repertory of behaviors from nowhere but they are a consequence of various factors, both structural and, perhaps, first of all functional – related to the course of primary functions" (Pluta-Wojciechowska, 2013: 133), which has been indicated above (Konopska, 2006; Pluta-Wojciechowska, 2007). The orofacial complex is therefore a special system of communicating vessels, where the activity of different muscle groups, when executing different actions in this area, impacts on the construction of its structures, while on the other hand the size, shape and proportions of different elements of the structuration determine the motor abilities of the muscles (Łuszczuk, 2012; Łuszczuk, 2017), including the tongue's resting position and its movements when executing different functions. Therefore, metaphorically speaking, function and morphology are two sides of the same coin, and a change in one has, to lesser or greater extent, to influence a change in the other because this system is a closed one.

A vital element in the construction of the structures of the orofacial complex is the tongue frenulum, which largely determines its motor abilities (Ostapiuk, 2005; Ostapiuk, 2006; Ostapiuk, 2018; Pluta-Wojciechowska, Sambor, 2016), consequently it influences both the tongue's resting position in the course of executing primary functions, and in the course of speaking. Its quality is significant as is the place of its attachment both on the tongue and at the bottom of the oral cavity (Ostapiuk, 2005; Ostapiuk, 2006; Ostapiuk, 2018; Pluta-Wojciechowska, Sambor, 2016). Worth highlighting are also the changes taking place during the child's growth and development (Pisulska-Otremba, 1995), particularly between the age of four and six, when the proportions of the oral cavity dimensions change, as well as the proportion of the oral cavity volume and the size of the tongue. This is connected with the dynamic growth of the bone structures that form the hard skeleton of the oral cavity, with growth of the tongue being significantly slower

(Łuszczuk, 2012; Łuszczuk, 2017; Łuszczuk, 2018). As a result, the tongue gains more space for movements, thereby being able to achieve greater precision of its setting both at resting position and while executing various actions. In the case of a patient with the shortened tongue frenulum, it may be difficult to achieve the correct tongue position, with the oral cavity successively growing larger (Łuszczuk, 2018).

According to specialists, the abnormal resting position of the tongue is the cause of occlusion disorders (Konopska, 2006) and of some articulation defects (Pluta-Wojciechowska, 2013). It may be difficult to identify the causes of diagnosed abnormalities but the logopedist seeks to diagnose them and eliminates them as far as possible in the treatment process, knowing that the success of the therapy program being applied depends on this. In the case of the logopedist who treats articulation disorders, the fundamental thing is his/her knowledge and ability to assess all morphological and functional elements of the orofacial complex. It is therefore essential not only to diagnose the abnormal resting position of the tongue and show its relationships with the incorrect realization of phonemes but also to find what determines this particular resting position.

INTER-SPEECH POSTURE (ISP)

The inter-speech posture, which Pluta-Wojciechowska and Sambor (2017) propose to call the "inter-speech posture of the speech organs", refers to the position of the speech organs, in particular the tongue, in the course of producing verbal utterances during pauses: filled and unfilled (Pluta-Wojciechowska and Sambor, 2017).

The inter-speech posture of the tongue differs from its resting position, which refers to the positioning of the tongue in the oral cavity during physiological respiration. Studies show that the tongue's inter-speech posture is related to the features of the phonetic and phonological system of a given language, which means it is different for different languages (Gick et al., 2004; Pluta-Wojciechowska, Sambor, 2017)[2]. Being related to a given phonetic-phonological system, it is closely connected with the produced settings and the position and movements of the speech organs in a given phonetic system (Pluta-Wojciechowska, Sambor, 2017; Gick et al., 2004). It can be said that it is the starting position enabling the rapid execution of successive planned movements and settings that are necessary for producing the sounds of a particular language. According to the principle of ergonomics

[2] Studies explain that the established inter-speech posture for one language may hinder learning another. Learning a foreign language should thus involve the acquisition of its characteristic inter-speech resting posture of the tongue (Gick et al., 2004; Pluta-Wojciechowska, Sambor, 2017).

denoting maximum result with minimum effort, the tongue remains in the position and assumes the shape that enables the quickest and most accurate achievement of successive articulatory positions for the sounds of a given language.

Polish is a moderately consonantal language, which means that the frequency of consonantal phonemes accounts for over 80% of the total repertory of phonemes (Maciołek, Tambor, 2018; Pluta-Wojciechowska, Sambor, 2017). There is a large number of affricate and fricative dental, alveolar and palatal consonants, which are characteristic of the Polish language (Maciołek, Tambor, 2018; Pluta-Wojciechowska, Sambor, 2017). Their high frequency as well as a considerable participation of consonantal groups and the features of the Polish [r] require a substantial mobility of the tongue, especially its front part. The main point of articulation of 19 Polish consonants (67% of the whole stock of basic consonants) is connected with the elevation of the tongue with a simultaneous formation of three-dimensional depressions of different size in different places on its surface. Their production is thus based on the use of different variants of the vertical-horizontal position with the simultaneous retention of the stable position of the tongue sides (Pluta-Wojciechowska, Sambor, 2017). This position makes it possible on the one hand to achieve median air flow, while on the other the modulation of the oral space, i.e. the formation of constrictions of different shape and size in different locations in this space through the setting of the tongue characteristic of the articulation of individual sounds. Furthermore, this position enables the appropriate mobility of the tongue tip, resulting in vibration specific to the Polish [r] (Pluta-Wojciechowska, Sambor, 2017).

On the basis of observation of the tongue position during utterance production, Pluta-Wojciechowska and Sambor observe (Pluta-Wojciechowska, Sambor, 2017: 184, 186) "the elevation of the tongue sides to the level between the lower and upper arch, the apex being above the incisive margins of the upper incisors", or "the elevation of the tongue sides to the level of the crowns of the upper arch, the apex being between the upper and lower incisors", and at the same time, the tongue "remains positioned almost as high as the upper arch, without being inside it". The two scholars stress that the "so-called normal" inter-speech posture "is a vocalic position that, consequently, does not require the stabilization of the tongue, with the sides being rested on the lateral – premolar and moral – upper teeth". The inter-speech posture for Polish thus oscillates between [e] and [y]; it is therefore not accidental that these sounds appear as pause fillers. When comparing the inter-speech posture with the vertical-horizontal position, which is characteristic of both the resting position during breathing at rest and in the course of swallowing, they observe that it is lower, which is associated on the one hand with the possibility of air intake through the mouth during speech, while on the

other hand it ensures the economical and ergonomic possibility of quick movements and following in quick succession in the course of producing sequences of successive sounds[3].

Studies show that the tongue position is determined by anatomical-functional conditions (Pluta-Wojciechowska, Sambor, 2017), i.e. it depends on the structure and actions of the tongue; it is also related to the course of primary functions because the prototype of articulatory movements is the movements occurring during the primary functions (Pluta-Wojciechowska, 2013; Pluta-Wojciechowska, Sambor, 2017; Sambor, 2014/2015). Since the orofacial complex works as a whole, the function of all the muscles of this system, not only the tongue muscles and the structure of all its elements – will be of importance for the proper setting of the tongue.

TONGUE BRACING (TB)

Polish literature on the subject – the publications and studies on articulation, both in respect of the description of the norm and pathology – focuses first of all on the activity of the front part of the tongue. Changes taking place in this area, with regard to the tongue's shape and changes in its location in relation to other structures of the orofacial complex, cause changes in the shape of the space (oral cavity), forcing a specific air flow through this space, which determines specific features of the produced speech sounds (Lorenc, 2013; Lorenc, 2016a). In literature, both Polish and foreign, despite the fact that both the tongue and oral cavity are three-dimensional objects, in the descriptions and models of articulation the sagittal sections are dominant in which the transverse dimension is not taken into account (Albiński, 1925; Maciołek, Tambor, 2018; Maeda, 1990; Parol, 1994; Rubin et al., 1981).

This part of the article will discuss the position of the posterior part of the tongue in the posterior part of the oral cavity in the course of producing utterances, which is termed *lateral tongue bracing*.

The earlier studies, conducted using mainly electromyography, and investigating different varieties of English, show that during speech the tongue – with small exceptions – is in constant contact with the upper molars and the part of hard palate adjacent to the teeth (Gibbon et al., 2010; McLeod et al., 2006; Stone, 1991). It was assumed that this "immobilization" of the lateral parts of the tongue not only ensures somatosensory feedback on its position (Stevens, Perkell, 1977), but first of all facilitates the movement of its front part (Stone, 1990) and separates

[3] On the basis of their observations, Pluta-Wojciechowska and Sambor observe that in the case of persons in whom defective realizations are determined by the abnormal structure or functions of the speech organs, the inter-speech posture is lower (Pluta-Wojciechowska, Sambor, 2017).

the central part of the oral cavity from the lateral parts (Honda et al., 2010; Perkell, 1979). This "tightening" along the margins of the tongue is, on the one hand, the base for tongue movements serving to produce any speech sound; on the other hand, maintaining of the constant lateral contact of the tongue with the palate and the internal surface of the upper molars creates a channel through which the air stream flows, modified depending on the changing parameters of the channel (Gick et al., 2017). The contact between the tongue and other structures of the oral cavity is not only not accidental but necessary for correct articulation. The tongue thus remains stable during speech, while changes in the parameters of the channel of the air stream are caused first of all by the action of the tongue's intrinsic muscles (Honda et al., 2013).

More recent studies using other research techniques, inter alia virtual models, simulation and imaging with the use of ultrasonography, show that the contact between the tongue and the upper molars together with the adjacent part of the hard palate is active (Gick et al., 2017, Łuszczuk et al., 2018; Luo et al., 2019), and requires a strong activation of the tongue's extrinsic muscles: the mylohyoid muscle, (*m. mylohyoideus*, ML) and the posterior and medial genioglossus (*m. genioglossus posterior et media*, GGP/GGM), as well as the tongue's intrinsic muscles: the upper longitudinal muscle (*m. longitudinalis superior*, SL) and the transverse tongue muscle/transversus linguae (*m. transversus linguae*, VRT). And the same time a low activation is necessary of the tongue's intrinsic muscle i.e. the inferior longitudinal muscle (*m. longitudinalis inferior*, IL) and the extrinsic lingual muscles: hyoglossus (*m. hyoglossus*, HG) and the anterior genioglossus (*m. genioglossus anterior*, GGA). A simulation study has shown that to maintain TB, a significant role is performed by the transversus linguae (*m. transversus linguae*), which flattens and widens the tongue, by the mylohyoid muscle (*m. mylohyoideus*), which elevates the tongue in such a way that the lateral edges reach the upper teeth and the posterior genioglossus (*m. genioglossus posterior*) and the superior longitudinal muscle (*m. longitudinalis superior*), which provide an additional activation necessary for maintaining the anterior contact (Gick et al., 2017). It is therefore more appropriate to call this phenomenon "bracing" rather than simply "contact" to stress that it is not merely the passive result of the tongue's mechanical properties (Gick et al., 2017). It also appears that in order to properly stabilize the tongue, it is necessary to stabilize the mandible, which means that this process involves many muscles of the head and neck, even those very distant from the area in which this phenomenon occursTongue bracing, providing the mechanical support of the tongue, is maintained almost continuously during speech. Studies on different varieties of English reported that complete loss of lateral contact is found only in two contexts: when realizing some cases of low vowels and some cases of the lateral consonant [l]. In all cases concerning [l], the loss of

lateral contact entailed the creation of another contact in another location in the oral cavity, the contact of the tongue's crown with the front part of the palate taking place before the release of lateral contact, and its loss after regaining lateral contact again (Gick et al., 2017). This indicates an active effort to ensure maintenance of the appropriate tonus of the relevant muscles, thus confirming the view that this plays a significant mechanical role in the speech production system. Asymmetry was also observed regarding loss of lateral contact in the case of one-sided loss of contact as well as the order of the contact side in the case of bilateral loss of contact. This asymmetry may be connected with side dominance, like in the case of right- or left-handedness (Gick et al., 2018; Liu et al., 2018; Pribram, 1977).

The existing preliminary studies show that this bracing is found regardless of language. Tests were made covering six languages: Cantonese, Korean, Mandarin, Portuguese, Spanish, and Turkish, and in all of them tongue bracing was found to be an almost permanent phenomenon, although different numbers of contact loss were reported in each of the languages analyzed. Further studies in this area are indisputably necessary because the text samples were not balanced with regard to the frequency of phonemes, consequently, the number of phonemes that require lateral bracing was different for different languages (Cheng et al., 2017). It can therefore be surmised that tongue bracing is biological, functional, thus being independent of the kind of language the speaker uses. This would mean that specific properties of languages are determined by the movements and position of the front part of the tongue in relation to the oral cavity. Emphasis is also placed on the linkage between tongue bracing and the physiological primary functions of the orofacial complex such as those associated with taking food or breathing (Mayer et al., 2016; Mayer et al., 2017; Mayer et al., 2018; Gick et al., 2017).

In interdisciplinary research comprising simultaneous investigation of occlusal conditions and articulation, it was found that during speech the tongue does not adjust each movement to changes of the mandibular position relative to the jaw, whereas it adjusts and maintains bracing. The outcome of this compensation is the correct quality of speech sounds despite disorders in the position of the mandible relative to the jaw. This explains the compensatory mechanism of the tongue's work in occlusal disorders, and why even very intense defects may not significantly affect the quality of articulation. The investigation was concerned with selected occlusal disorders; therefore this phenomenon requires more thorough studies (Cheng et al., 2016).

Studies on tongue bracing utilize ultrasound scanning. Fig. 1, represents one frame obtained while examining a Polish speaker by means of an ultrasound scanner.

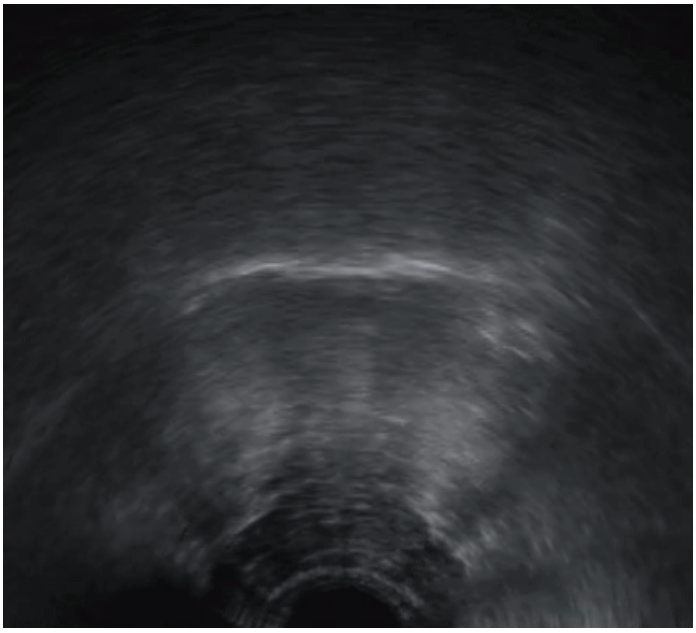


Fig. 1. The transverse view of the tongue obtained in ultrasound examination
Source: Own study.

The examination was performed using the ALOKA ProSounsd SSD 5000 ultrasound scanner. A convex-type head, which ensures a wide examination field, was used in the examination. During scanning, the speaker remained motionless on the upright diagnostic chair, with the upright backrest and armrests providing support for the arms, and with his head stabilized by side and back headrests. The scanner head with transmission gel to provide the proper ultrasound flow was positioned in the transverse projection in direct contact with the subject's skin. The examination objective was to determine the tongue position in the posterior part of the oral cavity, which is why the head was placed in a strictly defined point under the bottom of the oral cavity between the mandible arms: at the front from the hyoid in the projection of the first molars, parallel to the axis of the subject's body, and perpendicularly to the other two planes of his body.

The speaker was an adult without any certified disability or need for aid, who also confirmed the absence of hearing problems. At the beginning, the articulation and occlusal norms were ascertained, and no abnormalities or other disorders were observed in the lingual frenulum or in the structure or functioning of the orofacial area. The examination used the text of the poem *Ptasie plotki* [*Birds' Gossip*] by Jan Brzechwa because of a large accumulation of sounds characteristic of Polish.

The subject read the text shown as continuous on the screen positioned close to his eyes. During the examination, changes of the tongue's position obtained by means of the ultrasound scanner were recorded and saved on an electronic medium for subsequent processing and analysis.

Later, the preliminary processing of the material by means of the ImageJ program was used (*Schneider et al., 2012),* which allows dividing the recording into successive frames and enables its analysis. By marking the planes in the ultrasound images and combining them, kimograms were obtained which enable the assessment of changes in the tongue positions in time. In each image, three planes were marked: the medial one running centrally through the middle of the tongue, perpendicularly to its surface, and two oblique ones, running at the angle of 45^{o} relative to each other, located at an equal distance from the central plane. The image frame obtained in the examination with the marked planes is shown in Fig. 2.

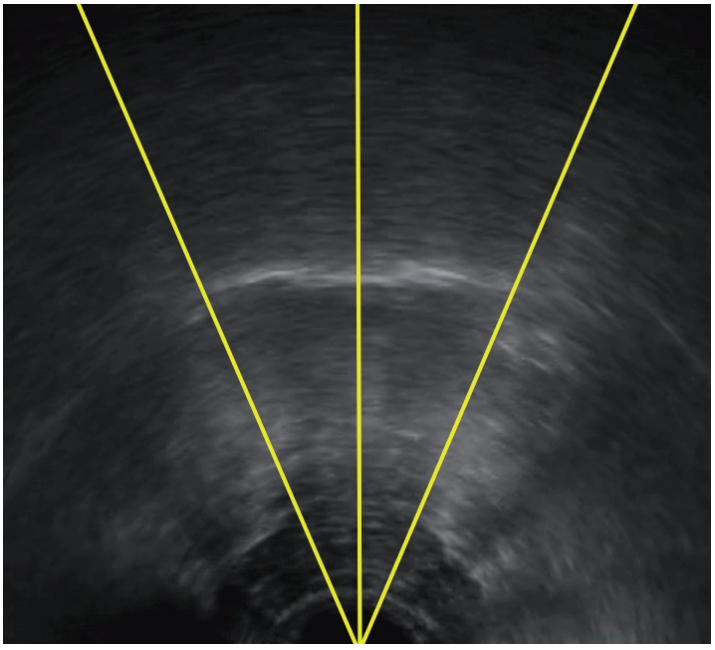
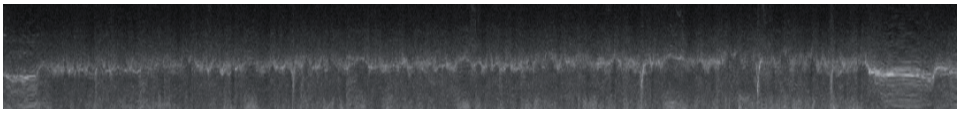
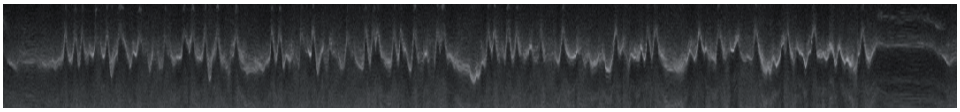


Fig 2. The tongue's image in the transverse view with marked planes
Source: Own study.

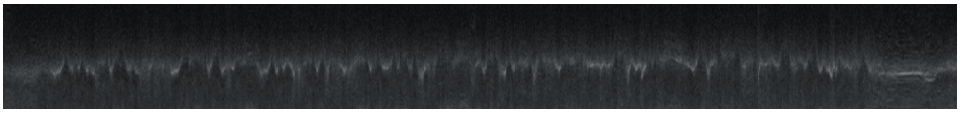
Three kimograms were obtained in this way, showing changes in the position of the central and lateral parts of the tongue that take place during speech. They are presented in Fig. 3 below.



(a) right part of the tongue



(b) medial part of the tongue



(c) left part of the tongue

Fig. 3. Kimograms from the recording in the course of ultrasound examination in the transverse view, and showing the a) right, b) medial, and c) left part of the tongue
Source: Own study.

The bright points correspond to the tongue surface, and dark ones – to its deeper layers, when they are below them. The dark points located above are the image of the air in the oral cavity. The assessment and comparison of the presented pictures indicates significant differences. The bright points in the kimograms presenting the location of the tongue's lateral parts are more stable than the bright points presenting the positioning of the medial parts, which means that the medial part of the tongue is far more mobile than the lateral parts. This confirms the findings of research with regard to other languages (Cheng et al., 2017).

CONCLUSIONS

Three phenomena have been described that are connected with the tongue's positioning in the oral cavity at rest and in the course of utterance production.

The tongue's resting position is the position that the tongue assumes during free respiration, connected with the elevation of its front part, its wide shape being preserved.

The tongue's inter-speech posture refers to the tongue position when producing a verbal utterance during pauses and is associated with the features of the phonetic and phonological system of a language, which means that it differs depend-

ing on the language. For Polish, the tongue adopts the vocalic position, between the realization of [e] and [y] and does not require stabilization. The inter-speech posture is therefore lower than the vertical-horizontal position characteristic of the tongue's resting position.

Tongue bracing involves the stabilization of the posterior part of the tongue in the posterior part of the oral cavity in the course of utterance production. It is connected with the activity of many muscle groups, being therefore biological. It thus occurs regardless of the speaker's language and, with slight exceptions, it is a permanent phenomenon during speech.

A linkage should be pointed out between the phenomena in question and the physiological primary functions of the orofacial complex such as the functions connected with taking foods or breathing. All functions realized with participation of the tongue in the oral space are without doubt interconnected: the patterns of the movements of the primary functions are prototypical – in the mechanical sense – of secondary functions. These functions are certainly also determined by the anatomical-functional conditions of the orofacial complex. This suggests focusing greater attention both on the analysis of the course and evolution of the primary functions and on the assessment of anatomical structures.

These reports also prompt the expansion of the area of the logopedist's interest in the posterior parts of the tongue. The stabilization of the tongue's edges, which is a biological phenomenon, ensures the regular mobility of its front part, which is different depending on the speaker's language. It can therefore be assumed that the abnormal or insufficient lateral bracing of the tongue will not ensure the ability to execute the correct movement of its front part or will result in the emergence of supplementary points of bracing in another place in the oral cavity with the participation of another part of the tongue. This could explain the difficulties in achieving satisfactory result of therapy in some patients in whom, possibly, tongue bracing is incorrect or unsatisfactory. In such circumstances, attempts to develop the regular articulatory system through exercises that focus on the front part of the tongue must be doomed to fail. The therapist's attention should focus first of all on the setting of the posterior part of the tongue and on finding the cause of abnormalities in this case. This suggests the need for deep reflection on the approach to logopedic therapy.

The presented phenomena connected with the positioning of the tongue in the oral cavity and the relationships between them and the primary functions require extensive studies. In particular, research on tongue bracing is a pioneering one in Poland; it has already been undertaken by the author and will be carried on.

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