

J. G. TROMLITZ'S ARTICULATORY PHONETICS IN FLUTE SOUND FORMATION

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SUMMARY. The paper considers articulatory phonetics and specific features of its use in flute performance. The historical stages presented of phonemic bases formation and development for flute articulation during the 16-18 centuries. Flute treatises by S. Ganassi, J.-M. Hotteterre, A. Mahaut, Ch. DeLusse, J. J. Quantz are considered in chronological order, as well as analysis of "Auführlicher und gründlicher Unterricht die Flöte zu spielen" by J. G. Tromlitz. Technological aspects are disclosed of using various phonemic structures outside the speech process to develop tongue motility and generate various types of tonguing while playing the flute. The role is identified of *i* and *a* vowels in modelling instrument phonation mechanism and their influence on sound tone and volume. The main elements are highlighted of speech and vocal types for flute articulation, as well as their differences. The vocalization significance is analysed in relation to tone development and the instrument sound uniformity in the lower and upper registers. The significance is disclosed of J. G. Tromlitz's contribution to the flute articulation development and his innovative vocalization approaches to phonation technique.

Keywords: flute, articulation, phonetics, phonemic structures, vocalization, sound production, embouchure.

Introduction

Johann George Tromlitz (1725-1805) stands out in the German flute art of the XVIII century for his significant contribution to the flute didactics development, instrument making and performance. His extensive treatises

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“Detailed and Thorough Tutor for Playing the Flute” (“Auführlicher und gründlicher Unterricht die Flöte zu spielen”) and “About the Flute with Several Keys” (“Über die Flöten mit mehrern Klappen”) extended the flute pedagogy and performance aesthetics proposed by J. J. Quantz and showed a new author’s vision of certain fingering technique issues. Unlike his outstanding predecessor, who, as a multi-instrumentalist, composer and educator was trying to disclose in the fundamental treatise the main directions for flutist’s creative development based on own achievements, J. G. Tromlitz is limited to issues of flute didactics and performance and seeks to show all aspects of this topic in a quite complete and clear way³. It was the narrow differentiation outlined in the framework of the “thorough teaching of playing the flute” that apparently hindered the widespread popularity of the artist’s works compared to that one of J. J. Quantz’s treatise.

Tromlitz being a talented flutist differed not only in perfect purity of intonation, complete and steady sound, but also in performance accuracy. “He became the first one among those who, using a stronger sound, had a significant impact on the bravura virtuoso concert style development in flute rendering ...”⁴.

It should be noted that J. G. Tromlitz was one of the few flutists with a university degree, and although his career as a lawyer was fated to fail, the academic education with the University of Leipzig, which graduates during different years included such prominent German musicians as G. Kunau, G. F. Telemann, J. S. Bach’s sons – W. F. Bach, J. H. F. Bach, K. F. E. Bach, contributed to developing an analytical approach to determining the methodological basics for the flute didactics development. In covering the technological and artistic aspects of playing the flute Tromlitz makes efforts to analyse deeper than his predecessors and contemporaries (J.-M. Hotteterre, A. Mahaut, J. J. Quantz, F. Devienne) the existing issues and address these in a methodically correct and complete way. Paying a tribute to J. J. Quantz – “a worthy musician and one of the greatest flutists of the day, <...> who set the stage and showed <...> the way to move”⁵, Tromlitz at the same time resorted to a critical rethinking of certain postulates in his predecessor’s treatise. The reason for this revision was more than forty years of practical experience in own research and observations. The specified phonemic bases of articulation were specified among the issues of Quantz’s flute playing theory, which according to the Leipzig flutist required revision.

³ Johann George Tromlitz. *Auführlicher und gründlicher Unterricht die Flöte zu spielen*. Leipzig: A. F. Böhme, 1791, S. VIII.

⁴ Fritz Demmler. *Johann George Tromlitz: (1725–1805); ein Beitrag zur Entwicklung der Flöte und des Flötenspiels*. 2 Aufl. Buren: Knuf, 1985. S. 28.

⁵ Tromlitz, J. G. op. cit., S. VII.

The association of the mechanism for flute sound production with the process of speech, effected by the articulatory apparatus, has become a determining factor in the widespread use of various phonemic structures for the development of motor tongue and formation of various types of tonguing while playing an instrument.

The use of speech syllables outside the speech during playing the flute is one of the most effective ways to model the mechanism of sound production, where consonants are the basis for tonguing and sound onset, and vowels (vocalisms) have a decisive influence on the sound tone, volume, dimension and duration.

To date, the phonemic structures analysis is the most accessible method of studying the articulation mechanism used with flute in different historical periods. It allows not only establishing the characteristics of musical pronunciation, but also identifying the sound generation of the time, which is important for modern performers on authentic instruments that seek to reproduce truly the ancient music.

The origins of the articulatory phonetics formation in the theory and practice of playing the flute

Considering the stages of the articulatory phonetics formation in flute playing, it should be emphasized that the earliest examples of using the phonemic structures are found in the didactic manual for the longitudinal flute "La fontegara. Opera intitulata fontegara" Silvestro di Ganassi dal Fontego (1492–1565?). Here, the Italian musician-multi-instrumentalist and singer offers an extremely wide range of phonemic constructions for the development of sound production and expressive articulation while playing an instrument. The full range of his phonetic-articulatory "tablature" covers more than fifty options of one- and two-syllable structures intended for three types of tonguing: hard (*teke*), soft (*lere*) and intermediate (*tere*)⁶.

S. Ganassi's application for each tonguing method of two-syllable combinations with variable consonants, in contrast to one-syllable phonemic constructions characteristic of modern wind instrument playing technique, was most likely due to the need to observe differences in articulation of strong and weak beat sounds. There is a similar analogy in the systolic and diastolic functions of the heart associated with the contraction and relaxation of the heart muscle. In part, Ganassi confirmed this principle himself,

⁶ Ganassi, Silvestro. Translated Dorothy Swainson. *A Treatise on the Art of Playing the Recorder and of Free Ornamentation*. Ed. Hildemarie Peter, Berlin-Lichterfelde: Robert Lienau Musikverlag, 1959, p. 12.

explaining the difference between the “so-called direct and reverse tonguing”⁷. While explaining the articulation mechanism of the first syllable in **teke** phonemic structure, he emphasizes that **te** is produced by tonguing in the palate in front of the teeth, while **ke** syllable generates in the throat⁸, that is the front and back of the tongue.

Using the laminal consonants **t** and **l** in combination with the less pronounced backlingual **k** and vibrant **r**, S. Ganassi attempts to make more relief the performance of sounds located on a strong time of the beat. On the other hand, the use in articulation mechanism of different (front and rear) parts of the tongue significantly improved its motility. It should be noted that the type of combined tonguing **teke** proposed by the Italian musician with a slightly modified vowel version (**taka**, **tuku**, etc.), known as “double-tonguing” (English Double-tonguing, German Doppelzunge), is widely used today in the performance of double and triple staccato. Existing claims that in a time of S. Ganassi there was no “Double-tonguing” concept and “Opera intitolata fontegara” author used the phonemic construction of **teke** exclusively as a way of firm tonguing⁹, are not convincing. The lack of necessary terminology did not exclude the possibility of using a combined **teke** tonguing to improve the motility of the articulatory apparatus. We find confirmation to this with Ganassi himself, who advises to use three two-syllable phonemic structures not only to form a certain type of tonguing, but also at the fastest beats¹⁰.

Vowel sounds hold a prominent place in S. Ganassi’s articulatory phonetics representing a group of five basic phonemes – **a**, **e**, **i**, **o**, **u**. The use of such a wide range of vocalisms is explained by the author’s attempt to bring as close as possible the expressiveness of the recorder player to human voice. While playing the flute he sees only the “lack of the external form” of speech articulation that is the difference of its acoustic-auditory perception. Therefore, in his recommendations, the Italian multi-instrumentalist and singer insists on “using to the highest extent all features of the human voice”¹¹, or rather singing. This is evidenced, to some extent, by the title of the treatise itself, which is addressed to not only the recorder players, but “... even those who are fond of singing” (*etanchora a chisidiletta di canto*) as well.

⁷ Ganassi, Silvestro. Translated Dorothy Swainson. *A Treatise on the Art of Playing the Recorder and of Free Ornamentation*. Ed. Hildemarie Peter, Berlin-Lichterfelde: Robert Lienau Musikverlag, 1959, p. 14.

⁸ Idem.

⁹ Powell, Ardal. *The Flute*. Yale University Press, 2003, p. 38.

¹⁰ Ganassi, Silvestro. op. cit., p. 14.

¹¹ Idem, p. 9.

The vocal focus of S. Ganassi's flute didactics was obviously a consequence of his singing activity as a performer and teacher, who did not limit himself to playing wind and string instruments. As a singer, he experienced himself as a recorder player the benefits of forming the sound production technique with an instrument based on vocal articulation. Offering a wide choice of vocalisms for playing the recorder, Ganassi was confident in their effectiveness in improving the expressive and sonic instrument capabilities.

Phonetic "tablature" of S. Ganassi's flute articulation remains one of the most diverse and numerous in terms of the number of one- and two-syllable structures in the history of flute didactics of various eras. In the following centuries (XVII-XIX), following emergence of "La fontegara...", a significant narrowing takes place of the phonemic series of articulation. French cleric Thoinot Arbeau (1520-1595) in his theoretical treatise "Orchésographie" (1588) minimizes phonemic structures, reducing them to three options of one and two-syllable constructions (**tere**, **rele**, **te**). Preferring **te** as the most clear and sharp, he emphasizes its necessity in the performance by military flutists¹². The limitations of Arbeau's articulatory phonetics can be explained by purely theoretical considerations in dialogue with the student and the lack of professional skills of playing the instrument, as he was not a performer.

In this respect, the phonemic structures minimalism is much more complicated of Opéra de Paris soloist Jacques-Martin Hotteterre's (1674-1763) flute articulation, who in one of the first manuals for the transverse flute "Principes de la flute traversière ou flute d' Allemagne..." (1707)¹³ offers only two **tu** and **ru**¹⁴ syllables in order to avoid monotony in performance. However, even in such a limited form, the priority remains after **tu**, which is "more common and used almost everywhere"¹⁵. Hotteterre considers the need to use syllable **ru** with gradual movement of the quaver lengths of notes up or down, as well as depending on their number.

The reason for such limitations in Hotteterre's articulatory phonetics lies in his attempt to explain only basic issues of mastering instrument to students-beginners. This is exactly the purpose he announces, offering in the preface his "small work... for those who have a natural inclination to play

¹² Arbeau, Thoinot. *L'Orchésographie*. Langres: lehandes Preyz, 1588?, p. 19.

¹³ «Principes de la Flûte Traversière ou Flûte d'Allemagne, de la Flûte à Bec ou Flûte Douce et du Haut-Bois» are a didactic trilogy for traverso flute, recorder and oboe, which the author played in court orchestras.

¹⁴ Phonemic structures of J.-M. Hotteterre are listed in French version.

¹⁵ Hotteterre, Jacques-Martin. *Principes de la Flûte Traversière ou Flûte d'Allemagne, de la Flûte à Bec ou Flûte Douce et du Haut-Bois*. Paris, 1707, p. 23.

this instrument [the traverso flute] and need only the basics of instruction”¹⁶. Therefore, the issues of fingering and execution of basic ornaments became the priority for the author, to which he devotes a much larger part of the “Principes” compared to the technological subtleties of articulatory phonetics in playing the instrument.

One of the most famous German flutists of the XVIII century J. J. Quantz played a special role in the flute articulation and its phonemic components development. His main achievement was the development of a fundamental flute playing theory, the main provisions of which were set out in “Versucheiner Anweisung, die Flöte traversiere zu spielen” (1752). J. J. Quantz devotes an entire chapter to the articulation and function of the flute¹⁷, as well as “... oboes and bassoons, playing which has much in common with the flute”¹⁸. Unlike his French counterpart, he expands the phonemic range of flute articulation and examines its mechanics in detail. In his work, Quantz only mentions J.-M. Hotteterre as one of the French flute school representatives, but does not refer to his “Principes...” The treatise lacks any indications of earlier manuals for flute by other authors, which indicates Quantz’s attempt to present to the reader his own performing and pedagogical experience in mastering the instrument. Confirmation of this is the very title of the treatise “Experience of guidelines...” (Versuch einer Anweisung...), which outlines the nature of its main content.

Justifying the need for using phonemic constructions in flute playing, the German musician said, “To make the tone of the flute speak properly with the aid of the tongue and the wind that it allows to escape <...> pronounce certain syllables, in accordance with the nature of the notes to be played”¹⁹. Based on a personal vision of the mechanism formation and development principles for sound production and flute articulation, he chooses three groups of one- and two-phoneme constructions. According to him, the first one includes two syllables – **ti** and **di**, which are decisive for prompt and soft tonguing, the second – two-syllable phonemic structures **tiri**, **diri** and third one – **did’Il**²⁰.

The indisputable novelty of J. J. Quantz’s articulatory phonetics was the use of phonemic construction **did’Il** in playing the flute for “the so-called

¹⁶ Hotteterre, Jacques-Martin. *Principes de la Flûte Traversière ou Flûte d’Allemagne, de la Flûte à Bec ou Flûte Douce et du Haut-Bois*. Paris, 1707, Preface.

¹⁷ Quantz, Johann J. *Versuch einer Anweisung, die Flöte traversiere zu spielen*. Berlin, 1752. Das VI. Hauptstück. *Vom Gebrauche der Zunge beidem Blasen auf der Flöte*, S. 60-73.

¹⁸ Idem, S. 71.

¹⁹ Quantz, Johann J. Translated Edward Reilly. *On Playing the Flute*. Second edition. Boston: Northeastern University Press, 2001, p. 61.

²⁰ The articulatory phonetics by J. J. Quantz is given in the original German version.

Double Tongue”²¹. He was the first one among flutists to introduce the concept of “Double Tongue,” which he considers as an important element in the motility development of articulatory apparatus. While the two-syllable *tiri* structure is offered to perform “not very lively passages” and “is indispensable in dotted notes”²², the author advises to use *did’II* as the basis of a double tongue “... only in quick passages”²³.

Considering *did’II* combination as such that is easy to hear, he points out the difficulty in the accuracy of its written transcription and mastery of the flute. That is why it is hard to form an opinion today to what extent *did’II* phonemic structure corresponded to the articulation mechanism of double tongue used by the German flutist.

When analysing *did’II* based on modern criteria of the double tongue mechanics (double staccato), it does not correspond to our understanding of this articulation type. Within *did’II* phonemic structure the first part *di* and the second *d’II* begin with the same consonant *d*. It is known that the basic principle of double tongue mechanics is the mandatory presence of two syllables or two monosyllabic constructions with different consonants (*taka*, *t k*), the pronunciation of which alternately involves the front (tip) and back (root) of the tongue. However, *did’II* structure lacks these defining elements for a double tongue.

Most likely J. J. Quantz managed to find the exact phonemic equivalent to reflect the mechanics of double tongue articulation. This is evidenced by his own doubts whether *did’II* would sound better while listening rather in writing.

Feeling the possible inconsistency of phonemes written fixation and their pronunciation, the author attempts to describe in detail the articulation mechanism of double tongue. “To articulate *did’II*, one should first say *di*, and while the tip of the tongue springs forward to the palate, quickly draw the middle portion of the tongue downward a little on both sides, away from the palate, so that the wind is expelled on both sides obliquely between the teeth. This withdrawal of the tongue will then produce the stroke of the second syllable *d’II*; but it can never be articulated without the preceding *di*”²⁴.

Most likely, if J. J. Quantz was familiar with S. Ganassi’s two-syllable articulation system, who already formed much simpler phonemic structures for “direct and reverse tonguing”, he would have avoided difficulties in their oral and written identification. Despite the phonetic complexity *did’II* pronunciation,

²¹ Quantz, Johann J. *On Playing the Flute*, p. 68.

²² Quantz, Johann J. *Versuch einer Anweisung*, S. 66.

²³ Idem, S. 68.

²⁴ Quantz, Johann J. *On Playing the Flute*, p. 79.

its use in the double tongue articulation persisted in German flute didactics during the second half of the XVIII century. Phonemic system of J. J. Quantz's flute articulation, despite a critical rethinking of its individual elements, became the basis of J. G. Tromlitz's articulatory phonetics.

J. G. Tromlitz's articulatory phonetics

Similar to J. J. Quantz, J. G. Tromlitz devotes a separate section to speech process and tongue functions in flute sound production. Tromlitz considers the need to use "certain symbols" in flute playing primarily to explain tongue functions while playing an instrument:

"It is impossible to say: at this point the tongue must be placed in this way, or positioned, used or moved in that way for that passage; nobody at all would be able to imitate that easily, since the movements of the tongue are not visible. So [we need] another method. On close scrutiny you will notice that the tongue's movements when producing the notes form a species of syllables, and when they are combined, words, and finally a vocabulary, which it is possible to apply universally according to a suitable system"²⁵.

J. G. Tromlitz, while developing own articulatory phonetics system, does not resort to radical changes and revision of existing traditions, and attempts to make some additions to improve the expressiveness of performance. Based on J. J. Quantz's phonemic structure he is critical of using by the latter of vocalism *i*, keeping the line of consonants unchanged. Tromlitz gives as the main argument for changing vowel a certain tension and narrowing of the glottis while pronouncing *i*, which directly affects the process of sound production, "*making the flute's tone thin*"²⁶.

Emphasizing the physiological mechanism of vowels pronunciation, he strongly recommends to use *a*²⁷, "*...which makes the tone fuller, rounder and brighter, and to my taste there is none more suitable than a. Make an effort to enunciate this a as much like an a as possible, and you will find that because the throat and other relevant parts expand the tone becomes fuller. Instead of ti or di, we have the syllables ta, da, or ra*"²⁸.

²⁵ Tromlitz, Johann George. *Auführlicher und gründlicher Unterricht die Flöte zu spielen*. Leipzig: A. F. Böhme 1791. S. 157; Tromlitz, Johann George. Translated Ardal Powell. *The virtuoso flute-player*. Introd. by Eileen Hadidian. New York: Cambridge Univ. Press, 1991, pp. 152–153.

²⁶ Tromlitz J. G. *The virtuoso flute-player*, p. 153.

²⁷ German pronunciation.

²⁸ Tromlitz J. G. *The virtuoso flute-player*, p. 153.

Choosing **a** as a main component of all phonemic constructions of his own articulatory system, the Leipzig flutist simultaneously abandons the vowel **u**, which, in his opinion, sounds even worse than **i**²⁹. The last author's remark regarding **u** sound volume is given without proper argumentation and raises some doubts about his familiarity with the famous flute manuals of his French colleagues (J.-M. Hotteterre, A. Mahaut, Ch. DeLusse). In terms of physiology the larynx and vocal cords in **u** vocalism articulation are not exposed to an additional tension, but on the contrary contribute to the achievement of greater roundness in sound production with the flute. An illustrative example of this is the didactic manuals by already mentioned J.-M. Hotteterre, A. Mahaut³⁰, Ch. DeLusse³¹, and subsequently by Professor of the Paris Conservatory F. Devienne³², where **u** vowel remained the basis of flute articulation. Indirectly, the author's lack of awareness of flute didactic literature is evidenced by his complaints that "nothing worthwhile" except for Quantz's treatise had been published for the instrument at that time. Therefore, the final alphabetical register does not show names of famous French flutists and teachers J.- M. Hotteterre, A. Mahaut, whose manuals were published before the work by J. J. Quantz.

Tromlitz, when choosing **a** vowel to ensure the "maximum open throat" and timbre-based filling of the flute sound, tries to move the instrumentalist closer to the vocal technique of sound production. His own experience of concert performances with the famous German singer Gertrud Elisabeth

²⁹ Tromlitz J. G. *The virtuoso flute-player*, p. 153.

³⁰ A. Mahaut, same as J.-M. Hotteterre suggests using **turu** as the main syllables to articulate the double tongue. He borrows J. J. Quantz's **did'll** phonemic structure; however, for a more expressive pronunciation he supplements it with an additional **e** (**di del**) vowel. (Mahaut A. *Nouvelle Méthode pour Apprendre en peu de temps à Jouer de la Flûte Traversière*. Paris: Lachevardiere, [1759], p. 25). Quantz is known to have opposed the use of these syllables in the double tongue articulation.

³¹ Charles DeLusse like his compatriots, considered **tu** syllable to be the main type of flute articulation. He demonstrates a completely different approach compared to J. J. Quantz in the double tongue articulation, choosing for this vague phonemic structure **loul** (DeLusse, Ch. *L'art de la flûte traversière*. Paris: chez l'auteur, [1760?], p. 4).

³² François Devienne opts for **turu** as flute tonguing basis. However, for double tongue articulation he offers a two-syllable phonemic construction of **dou gue**, which is much more effective than that one of Quantz. Despite significant improvement of tongue motility when using these syllables and the expressiveness of articulation, the Professor considered it inappropriate to use a double tongue in flute playing. According to him, "... if they are not uttered, they are no less defective, because they sound only like an unpleasant muttering to the ear" (Devienne, F. *Nouvelle méthode théorique et pratique pour la flûte*. Paris: Imbault, 1794, p. 9).

Mara (1749-1833)³³ and unforgettable impressions of insightful performance by the Italian castrato Giovanni Carlo Concialini (1742-1812)³⁴ of “beautiful slow melodies” became decisive in the introduction of vocal principles of flute sound formation.

This idea was not a new one. In addition to the multi-instrumentalist singer S. Ganassi, J. J. Quantz voiced it repeatedly in treatise and “Autobiography”³⁵. In the latter, he assessed as a competent singer³⁶ the mastery of vocalists, whom he happened to listen to in Italy, Paris, London, Dresden and Berlin. When comparing the flute sound with a voice, Quantz argued that the pleasant sound of the flute is “more like a contralto than a soprano, and it is also called a chest sound”³⁷.

J. G. Tromlitz, characterizing the sound of the flute, oboe and violin, makes some adjustments to the flute timbre-register capabilities. Leipzig flutist emphasizes that these instruments players should take as an example the beautiful soprano and viola timbres³⁸. The vocal impact in treatise is mostly notable in the technological sections devoted to the issues of flute sound articulation and formation. There, the author repeatedly refers to the beauty of human voice and the benefits of expressive abilities, arguing, “The only example for an instrumentalist to produce his sound is a beautiful human voice. As to me, the beautiful human voice means bright, rich, resonant and firm, but not loud, soft, dim”³⁹.

³³ G. E. Mara – prominent German opera singer. The beginning of her solo performances relates to the participation in “Großes Concert” mentioned by Tromlitz. In different periods of her creative work she sang in the best opera houses and performed solo concertos in various cities of Europe and Russia (Leipzig, Dresden, Berlin, Vienna, London, Paris, Moscow, St. Petersburg, etc.). Having a voice range of almost three octaves (g to e³), Mara sang with equal ease in the lower and upper registers. Contemporaries noted: “All her tones sounded equally clean, smooth, beautiful and relaxed, as if it was not sung by a woman, but played on a beautiful parlor organ” (Gertrud Elisabeth Mara. In <https://www.belcanto.ru/mara.html>).

³⁴ G. C. Concialini – Italian castrato singer. Soloist of the Italian court theater of King Frederick II of Prussia. He served the king for more than 30 years (1765-1796). He also periodically performed in Italian opera houses.

³⁵ Quantz, Johann Joachim. “Herrn Johann Joachim Quantzens Lebenslauf von ihm selbst entworfen.” In Marburg, Friedrich W. *Historisch-kritische Beyträge zur Aufnahme der Musik*. Band I. Berlin, 1755, S. 197-250.

³⁶ Johann Quantz possessed the skills of opera singing and was well versed in vocal art (H.- P. Schmitz. *Quantz heute: Der «Versuch einer Anweisung, die Flöte traversiere zu spielen» als Lehrbuch für unser Musiziren*. Kassel: Bärenreiter-Verlag, GmbH & Co. KG, 1987, S. 7).

³⁷ Quantz J. J. *Versuch einer Anweisung*, S. 41.

³⁸ Tromlitz J. G. *Auführlicher und gründlicher Unterricht*, S. 109.

³⁹ Idem, S. 110.

Considering the physiological voice formation mechanism as a principle of modelling flute sound production, J. G. Tromlitz focuses not on speech, but vocal technique of sound formation. The complexity of the latter was to combine the sounds of the lower (chest) register with the upper one (falsetto). Prominent Italian neuter singer and teacher Pier Francesco Tosi (1654-1732) considered the highest level of the singer's skill the ability to combine chest voice with a falsetto so that it was impossible to distinguish them⁴⁰. J. J. Quantz, to achieve homogeneity of the flute sound and smooth transition from lower to upper register, pointed out:

Hence in general the flute corresponds with the human voice in that in the latter the larynx must be contracted or expanded in accordance with the proportion of the interval when you sing a scending or descending notes, while in the former the opening of them out hole must be made narrower for the ascending notes by advancing and compressing the lips and chin, and wider for descending notes by withdrawing and separating the lips. For without this movement the high notes become too strong, the low ones too weak, and the octaves untrue⁴¹.

This simplified mechanical way of connecting the sounds of the lower and upper registers to achieve uniformity of the flute sound does not look convincing enough. Offering plane embouchure correction of the tone hole cover depending on the registers, Quantz narrowed to a minimum the space for directing the air flow into the instrument, which negatively affected the sound tone and volume in the upper register. In addition, it should be added that *i* vowel remained the basis of Quantz's articulatory phonetics, which also negatively affected the flute sound and tone. A definite confirmation of the fact that Quantz's flute sounded insufficiently in the upper register is J. G. Tromlitz reference to one of his students, who highlighted this shortcoming of the teacher. J. G. Tromlitz himself noted in this regard that he often had to listen to Quantz's performance, "but since he ascended to *e*³*i* only and never higher", he was unable to ascertain the sound quality of the upper notes⁴².

However, criticizing Quantz's sound quality in the upper register, the Leipzig flutist does not offer a more effective way to achieve homogeneity of sound instrument. Tromlitz, while keeping the mechanism of covering the tone hole of the flute unchanged when moving from the lower register to the upper one, recommends simultaneously reducing the labial slit, "When the

⁴⁰ Tosi, P. Francesco. *Opinioni de' cantori antichi e moderni*. Bologna: Leliodalla Volpe, 1723.
Tosi, P. F. Translation J. E. Galliard. *Observations on the Florid Songor Sentiments on the Ancient and Modern Singers*. London: J. Wilcox, 1743.

⁴¹ Quantz, J. J. *On Playing the Flute*, p. 57.

⁴² Tromlitz J. G. *Auführlicher und gründlicher Unterricht*, S. 37.

chin pushes forward (not just lips, as they should never move separately from the teeth), the tone hole of the flute closes and, accordingly, becomes smaller, and the pressure of the upper lip on the lower one not only reduces the gap between the lips, but also gives air proper direction. Of course, this is a very small change in the transition from one note to the next one, it is so small that it is almost impossible to notice. You need to experiment, and hearing will direct⁴³.

Tromlitz constantly emphasizes the need for flutists to imitate good vocalists singing, but does not disclose functions the larynx, oropharynx, soft palate, respiration perform in achieving instrument sound uniformity in all the registers. When considering *a* instead of *i* vowel as the basis for flute articulation formation, he tries to guide performers to use a more open throat. However, the corresponding sound volume required much more detailed explanations of the articulatory apparatus in the process of sound production.

A key element in revealing the mechanism of flute sound formation on a vocal basis, which Tromlitz regarded as a model to emulate, was the need to define clearly the differences between the vocal and speech type of articulation. For the speech principle of flute sound production, the functions of the articulatory organs are close to the natural process of speech, while the vocalization of voice formation requires the use of a more intensive mechanism of sound production. In the latter, the role of breath, especially exhalation support, increases significantly, and the soft palate and larynx act more purposefully and actively.

To achieve complete flute vocalization in the lower and upper registers and their smooth connection, it was necessary to maintain the larynx position lower than during the natural speech, as well as to use the mechanism of covering the sound on transitional notes with a soft palate. Another important element of the flute sound vocalization was the support of breath, which ensured the stability of intonation and equality of the instrument sound in different registers. However, we found no detailed disclosure in J. G. Tromlitz's treatise, same as in J. J. Quanz's work, of vocalization mechanism for flute sound production, which would allow for its practical development. The reason for such incomplete coverage of issues related to vocalized flute sound production, apparently, was the limited author's knowledge of such important components of vocal technique of the time as breathing support, tone cover and others that were already known to the best vocal teachers.

⁴³ Tromlitz J. G. *Auführlicher und gründlicher Unterricht*, S. 36.

Conclusions

When assessing the importance of J. G. Tromlitz's articulatory phonetics in flute sound development, it is necessary to point out his achievements in flute pedagogy. The replacement of Quanz's *i* with **a** vowel can be considered as his most significant contribution, which becomes the basis for modelling the shape of throat in the instrument sound production. He saw the benefits of using **a** vocalism to expand the glottal aperture for achieving volume and even flute phonation in all the registers. Choosing the "beautiful singing" of Italian and German singers as a model to emulate, J. G. Tromlitz aims to improve the vocalization level of flute performance and achieve greater dynamism in sound formation and artistic expressiveness of performance. The lack of J. G. Tromlitz familiarity with the prominent Italian singers' treatises (F. Tosi⁴⁴) was a certain obstacle to detailed disclosure of using vocal technology in flute playing. This prevented him from describing in detail the mechanism of connecting lower (chest) register with the upper one (falsetto). However, despite some limitations in the presentation of technological issues of flute sound formation, J. G. Tromlitz still was a strong supporter of using vocal principles of sound production in flute didactics, for which a good singer was a role model.

REFERENCES

- Agricola, Johann Friedrich. *Anleitung zur Singkunst*. Aus dem Italiänischen des Herrn Peter Franz Tosi..., mit Erläuterungen und Zusätzen. Berlin, 1757. Herausgegeben und kommentiert von T. Seedorf. Kassel; Basel; London; New York; Prag: Bärenreiter, 2002.
- Arbeau, Thoinot. *L'Orchesographie*. Langres: lehandes Preyz, 1588?
- DeLusse, Charles. *L'art de la flûte traversière*. Paris: chez l'auteur, [1760?].
- Demmler, Fritz. *Johann George Tromlitz: (1725 – 1805); ein Beitrag zur Entwicklung der Flöte und des Flötenspiels*. 2 Aufl. Buren: Knuf, 1985
- Devienne, François. *Nouvelle méthode théorique et pratique pour la flûte*. Paris: Imbault, 1794.
- Ganassi, Silvestro. *La fontegara. Opera intitulata fontegara*. Venedig, 1535.

⁴⁴ Francesco P. Tosi's treatise "Opinioni de 'cantori antichi e moderni" was translated into German and published in 1757 (Johann Friedrich Agricola. *Anleitung zur Singkunst*. Aus dem Italiänischen des Herrn Peter Franz Tosi..., mit Erläuterungen und Zusätzen. Berlin, 1757).

- Ganassi, Silvestro. *Opera Intitulata Fontegara: Venice 1535: A Treatise on the Art of Playing the Recorder and of Free Ornamentation*. Ed. Hildemarie Peter, trans. eng. Dorothy Swainson. Berlin-Lichterfelde: Robert Lienau Musikverlag, 1959.
- Hotteterre, Jacques M. *Principes de la Flûte Traversière ou Flûte d'Allemagne, de la Flûte à Bec ou Flûte Douce et du Haut-Bois*. Paris, 1707.
- Hotteterre, Jacques M. *Principes de la Flûte Traversière ou Flûte d'Allemagne, de la Flûte à Bec ou Flûte Douce et du Haut-Bois*. Paris, 1707. [Deutsche Übertragung von H. J. Hellwig]. Kassel: Bärenreiter-Verlag, 1958.
- Mahaut, Antoine. *Nouvelle Méthode pour Apprendre en peu de temps à Jouer de la Flûte Traversière*. Paris: Lachevardiere, [1759].
- Powell, Ardal. *The Flute*. Yale University Press, 2003.
- Quantz, Johann J. *Versuch einer Anweisung, die Flöte traversiere zu spielen*. Berlin, 1752.
- Quantz, Johann J. "Herrn Johann Joachim Quantzens Lebenslauf von ihm selbstentworfen". In Marburg, Friedrich W. *Historisch-kritische Beyträge zur Aufnahme der Musik*. Band I. Berlin, 1755. S. 197-250.
- Quantz, Johann J. *On Playing the Flute*. Translated with notes and an introduction Edward Reilly. Second edition. Boston: Northeastern University Press, 2001.
- Schmitz, Hans-Peter. *Quantz heute: Der «Versuch einer Anweisung, die Flöte traversiere zuspielden» als Lehrbuch für unser Musizieren*. Kassel: Bärenreiter-Verlag, GmbH & Co. KG, 1987.
- Tosi, P. Francesco. *Opinioni de' cantori antichi e moderni*. Bologna: Leliodalla Volpe, 1723.
- Tosi, P. F. *Observations on the Florid Songor Sentiments on the Ancient and Modern Singers*. Trans. eng. Galliard J. E. London: J. Wilcox, 1743.
- Tromlitz, Johann George. *Auführlicher und gründlicher Unterricht die Flöte zu spielen*. Leipzig: A. F. Böhme, 1791.
- Tromlitz J. G. *The virtuoso flute-player*. Transl. by Ardal Powell. With an introd. by Eileen Hadidian. New York: Cambridge Univ. Press, 1991.