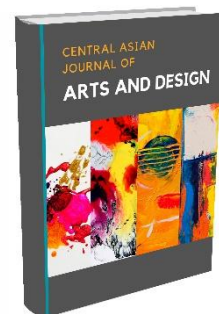




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Acoustics of the Voice Apparatus and the Acoustic Structure of the Voice

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Annotation

This article provides full information about the acoustics of the vocal cords, sounds, tonal sounds, sound power, acoustic structure of the voice, singing methods, singing pedagogy and methodology.

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Over the past period, the Republic of Uzbekistan has adopted a number of normative and legal acts on the development of culture and arts. In particular, the Resolution of the President of the Republic of Uzbekistan No. PD - 3391 of November 17, 2017 “ On measures to further develop the art of the Uzbek national makom”, August 26, 2018 Resolution No. PD - 3920 “ On measures for innovative development of the arts ”, Resolution No. PD-4038 of November 28, 2018 “ On approval of the Concept of further development of national culture in the Republic of Uzbekistan”, 2019 Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No. 1019 of December 19, 2019 “ On approval of the Program for improving the activities of museums in the Republic of Uzbekistan in 2020-2021”, November 23, 2019 Resolution of the Government of the Republic of Uzbekistan dated July 26, 2019 “ On approval of the activities of the Erkin Vakhidov Memorial Museum and the Treasury House-Museum” Resolution of the Cabinet of Ministers No. 630 [1] of May 30, 2019 “ On the organization of the activities of the state museum-reserves Sarmishsay”, “Shakhrisabz”, “Termez” and “ Kokand ” Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No. 443 of April 21 [2], 2020 “On measures to further increase the efficiency of the fine and applied arts” Resolution No. PD - 4688 of May 26, 2020 “Culture Decree No. PD-6000 of May 23 [3], 2020 “On measures to further enhance the role and influence of the arts in society” Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No. 325 of June 9, 2021 and “Martyrs’ Memory” Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No. 357 of February 2, 2022 “On support of the Moat Fund” The normative legal acts adopted, such as Resolution No. PD – 1 2 of the President of the Republic of Kazakhstan [4] are becoming increasingly important.

In the world of musical sounds, the human voice has a great place. Voice it is the first musical

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instrument, through which man began to express his feelings. All sounds coming out through the human vocal apparatus are called sound. The voice will be speaking, singing, without voice. A person can scream, gasp, imitate various sounds. No matter what kind of sound it is, whether it's a human voice or a piece of music, it can be studied. Sound movement is studied by the science of acoustics: in the science of acoustics, sound is understood as the result of vibration. A person speaks and sings in the air, so the vibration of the sound of these air particles is its wavelike rise and fall. In music, waves and sound generators are performed by an object: wires, compressed lips. When a person speaks, his voice not only goes out through the air, but also spreads through the internal organs, creating vibrations in the head and chest.

The source of the human voice is the vocal cords, as a result of their movement, vibration is created and the sound is heard. The waves generated in the hiccup spread in all directions: to the skin around the hiccup, up and down the airway. So the sound comes out partially. As we have already said, the waves grow stronger and weaker (in a stable environment). The air wave coming from inside does not merge with the outside air, but keeps oscillating. Paper floating in water can be raised and lowered by the wave, but it does not float with the wave, it just vibrates. Only a strong wind can scatter it around. So air is sound acts as a conductor of waves and the sound moves independently of its direction.

Sounds are divided into tones - tones with a certain pitch, undefined sounds - noises. All musical sounds have a definite pitch. Tone sounds are created when the vibrating medium vibrates continuously at a certain frequency. This sequence of vibrations creates a sense of pitch in the ear.[5]

Noises - both tonal and noisy sounds are produced in the voice apparatus when speaking and singing. All vowels are tonal, while consonants are voiced. As proof of our opinion, if we listen to the pronunciation of the letters S, P, Ch, Sh. In music, tonal sounds are made by gorvenor, and singing is done with vowels. All musical sounds have their own pitch, power and timbre. Musicians, singers, singing teachers distinguish a singer's voice not only according to its height, strength and timbre, but also according to its type and qualities (by comparison). For example: extended voice, or its opposite - straight voice, flat or spread voice, soft or hard, sharp cutting or velvety, chest or head, scattered or collected, strong or weak adjectives.

However, from the point of view of acoustics, these qualities are changes in sound and sound over time, that is, the frequency of vibration, its amplitude, and the composition of sound, its spectrum. These we refer to as pitch strength and timbre. Loudness is a subjective perception of the frequency of vibration is to achieve. One or another quality of pitch is produced only in one place of the vocal apparatus, that is, in the throat - in the vocal folds.

Depending on how much the vocal folds contract and expand during vibration, the air passing under it causes the sound frequency to be generated, that is, the volume, and no other movement can cause this process to change. Amplitude is the speed of sound vibration, i.e. the pitch of the sound is related to the level of tension of the vocal folds: the faster the vibration, the higher the sound rises to the folds. Sound power is the subjective creation of vibration by us and the amplitude of vibration.

Amplitude is the power of vibration and its frequency not related. If we hit one of the strings of the piano slowly with a hammer, then we hit it harder, the pitch does not change, only the force of vibration changes, that is, the force of shaking, during which the wire (string) vibrates and compresses the surrounding air. If the force of vibration is greater, the sound is subjective for us. The strength and height of the singer's voice depends on the expansion of the lower vocal cords, bronchus and trachea. The stronger the pressure from the eardrum, the stronger the vibration amplitude, and it has a strong impact on the eardrum and sounds hard. One of the complex qualities of a singer's voice is timbre. Musical tones are vibrations of different frequencies and strengths. The main thing in a complex sound

is the tone. It helps to determine the pitch - very small tones, or overtones, the strength of which creates a unique timbre.

As mentioned earlier, sound is a source of vibration, musical instruments; some objects can be a "source": wires, strings "lip". When sound-producing bodies vibrate, they can vibrate in all directions, not just lengthwise. A vibrating part with its own frequency pushes the air in all directions and thus creates overtones, for example: a vibrating string moves along its entire length. But the observations show that the parts towards the narrow interior can oscillate with half 3.4 chi parts. The frequency of these vibrations can be 2, 3, and 4 times more than the vibration along the entire length. This partial vibration of the string spreads through the air and gives it a unique timbre. In acoustics, a resonator is an air in a closed environment flow and it must have an outlet. The reason why it is called a resonator is that if we create a vibration in this airy environment, the resonator emits a sound with a specific pitch. The volume of the sound produced in the resonator is the volume of the air, the shape of the resonator, the place where the air exits kata - depends on the size.[6]

The personal tone of such a tone is called a resonator tone. From the acoustic point of view, a glass, an inflated balloon, a tube, a glass container can be a resonator. The smaller the size of the resonator, the smaller the volume of air, the higher the tone produced in the resonator, and this is called its personal tone. The smaller the air hole, the lower the individual tone. Of this a standing wave is formed at its base, which moves inside the resonator from its bottom to its edge and back. Since the speed of propagation of a wave in air is constant, at the same time, even in thin air, the wave can generate countless vibrations, that is, the individual tone has a high frequency.

On the contrary, if there is a lot of air, it will have a low frequency. So the personal tone of the resonator is low volume if - high, small volume - low. Let's take the Organ for example: low sounds are produced in pipes several meters long, while high sounds are produced in pipes 1-2 cm long. The concept of resonance is created in the resonator, just like in the tubes. A resonator, like resonance in wires, does not add power, only accumulates it. In resonators, the sound is louder to the listener only when it goes outside.

There are many places and tubes in the human vocal apparatus where resonance can develop. The trachea and bronchus, palate, pharynx, oral cavity, nose and small additional openings around them have very strong walls that can create resonance. The vocal apparatus is a kind of mouthpiece from the point of view of acoustics, which has resonator areas (palate, pharynx, mouth) on the vibration sources (vocal tract), which are the way for the sound to come out (through the mouth opening). reveals.

In the resonator places, we observe the characteristic amplification of the sound - formant, which determines how the sound will be. Always a low or high formant only if the sound is placed correctly we can observe, as well as known constant vibrato we observe the frequency, which depends on the timbre of the singer's voice. The sound of the singer also depends on the formant of the vowels, they differ from each other. Formant (lat. formans - forming) is a certain in acoustics additional sounds in frequency, a specific timbre of a voice or instrument, due to which speech sounds also differ from each other. It mainly occurs as a result of high resonator performance. A good (natural or applied) voice has two special enzymes: high (about 3000 hertz) - which creates sonority, lightness, and low (about 500 hertz) - which creates depth, masking.

Each vowel contains two partially amplified frequency bands called formants in its overtones. Each vowel sound is similarly characterized by the amplification of two head areas. Since our hearing ability has a good hearing range, it is extremely necessary to have a high pitch formant in the sound, and to hear a frequency of 2500-3000 Hz, which is considered a high pitch formant area. possible This area resonates with the external auditory canal of the ear, and at the same time it transmits these vibrations

to the eardrum.

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