

## Nature and Peculiarities of Interval Hearing Development

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**Abstract:** Interval hearing is one of the components of musical hearing and it implies the ability based on being aware of the perceptions, notions and the activity of producing intervals by a voice. Like all the other aspects of musical hearing, interval hearing can also be developed. The development of interval hearing can be enhanced by different work forms during solfeggio (sol-fa) lessons: intoning, analysis by ear, music dictation. The development of different aspects of musical hearing during sol-fa lessons is an important component for life and career of future professional musician. The aim of the research is to determine the peculiarities of interval hearing and to characterize the stages of its development. On the basis of long pedagogical experience, the stages of the development of interval hearing during the process of sol-fa lessons have been determined and characterized in this research. Research methods: the analysis of pedagogical experience, the comparison of contemporary methodologies worked out for developing interval hearing. The research was carried out in three directions: perception of intervals and chords by ear, activating associations; analysis of the perceived harmonic vertical, defining its theoretical concepts, as well as determining the analogy between the visual images of intervals and chords and their characterizations; musicking of simple polyphony forms during individual or collective musicking, implementing in practice the inner perceptions of polyphonic musicking (by singing, playing, composing the accompaniment, arranging). The pilot survey of music teachers on the development of harmonic hearing conducted during the project allowed identifying and specifying the problems of hearing development as well as establishing questions which arose analysing the assessment of work forms for the development of harmonic hearing during music lessons. The interval may be considered acquired only when it is being intoned precisely.

**Keywords:** interval hearing, mode, music education, phonism of intervals.

### Introduction

Music teachers are in a constant search for new forms and methods to develop musical hearing. Pure and rhythmic intoning by notes, correct perception and reproduction of music text comprise professional skills of a musician. Sol-fa is an integral part of other teaching disciplines in a musical-theoretical block of the system of contemporary primary, secondary and higher music education. In contemporary music science, great attention is given to studying the perception of pitch (Hargreaves, Lamont, 2017; Rauduvaite et al., 2016; Hallam, Cross, Thaut, 2008; Karaseva, 1999; Swanwick, Swanwick, 1994; Gillespie, 1993; Narmour, 1990), the features of musical hearing are discussed and recommendations for its development are provided (Urvanceva, 2014; Maslenkova, 2003). A unified classification of musical hearing has not yet been worked out in contemporary music pedagogy. Musical hearing is subdivided into external and internal, melodic and harmonic, absolute and relative hearing. *The problem of the research:* which activities employed during music lessons will enhance the development of interval hearing as one of the types of harmonic hearing.

According to the definition given by L. Maslenkova (Maslenkova, 2003), interval hearing is the ability to precisely assess the interval as a pitch correlation between two sounds which have definite stable expressive properties. According to D. Kirnarskaya (2009), interval hearing refers to sensing a distance between two sounds (two points) on the whole melodic line. The authors stress the fact that the emergence of the sense of interval means a new step in the formation of analytical hearing. In other studies (Fedorovich, Tihonova, 2014), *interval hearing* is being called *relative*, and it is defined as the ability to recognize and define pitch interval relations between sounds, degrees of mode; this ability also manifests itself in the skill of reproducing intervals (seconds, thirds, fourths) by voice or on the instrument with a non-fixed pitch in a melody as well as in a harmony. G. Zavadska, J. Davidova, A. Rauduvaite (2016) also draw a parallel between relative and interval hearing. In their opinion, the

sense of interval mode and the perceptions of interval mode provide basis for relative hearing. This derives from the fact that one and the same interval can be formed by different degrees of mode, and, consequently, in perception the absolute quality of the interval is not fixed to sounds that form it.

Like all the other elements of musical hearing, interval hearing can be developed. This hearing is based on the skill of perceiving and reproducing two-voice music. Intervals should be taught and learnt during the whole process of teaching, since its final goal is to enable the learners to freely use intervals in both singing and listening (Lewin, 2007).

The development of interval hearing requires active participation and a wish on the part of a student himself or herself during the whole teaching process. The teacher's task lies in helping the learners, namely, in motivating them to work hard on developing their hearing. Though the theoretical issues of musical hearing have been quite extensively explored (Hargreaves, Lamont, 2017; Marshall, 2010; Hallam, Cross, Thaut, 2008; Karaseva, 1999), the potentials of the development of interval hearing have not been sufficiently studied yet: in scientific literature a lot research works that relate to the perception of intervals (McDermott et al., 2010; Vurma, Ross, 2006; Schellenberg, 2001) can be found but the stages of formation and development of interval hearing have not been sufficiently explored.

The aim of the research is to determine the peculiarities of interval hearing and to characterize the stages of its development.

## Methodology

**The tasks of the research:** 1) to characterize the forms of work during music lessons that relate to intervals; 2) to reveal the peculiarities and differences between learning intervals within a mode and out of the context of mode; 3) to establish the succession of learning melodic and harmonic intervals.

**The methods of the research:** analysis of the pedagogical experience, comparison of contemporary methodologies worked out for developing interval hearing, survey.

Throughout the two-year period (from 2018 to 2019), students of the DU Music and Arts Faculty have been working on the development of their interval hearing. The research was carried out in three directions: 1) perception of intervals and chords by ear; 2) analysis of the perceived harmonic vertical; 3) musicking of simple polyphony forms. Nine students (between the age of 20 and 24) responded to the questionnaire.

Testing included such types of assignment: closed – where all possible variants of answers were given, and open – where the missing intervals had to be inserted. The results of testing were assessed by a three-point scale: a high level – 3 points; an average level – 2 points; a low level – 1 point. Two assignments were offered for every direction. The maximal number of obtainable points in the perception of intervals, analysis of intervals and music making was 54. Figure 3 shows the dynamics of results about the development of harmonic hearing in percentage ( $54 = 100\%$ ) during four semesters.

## Results and Discussion

### The analysis of pedagogical experience

The pilot survey of music teachers on the development of harmonic hearing conducted during the project allowed identifying and specifying the problems of hearing development as well as establishing questions which arose analysing the assessment of work forms for the development of harmonic hearing during music lessons (Likert scale). Therefore, 121 respondents from different regions of Latvia participated in the second pilot survey (Zavadaska, Ignatjeva, 2014). The respondents expressed their attitude to the development of harmonic hearing by assessing 11 indicators in bipolar scales within the scope of -3 to +3. A negative assessment indicated a critical attitude towards several working forms used for development of harmonic hearing, while a positive assessment testified usefulness and necessity of such forms (Figure 1).

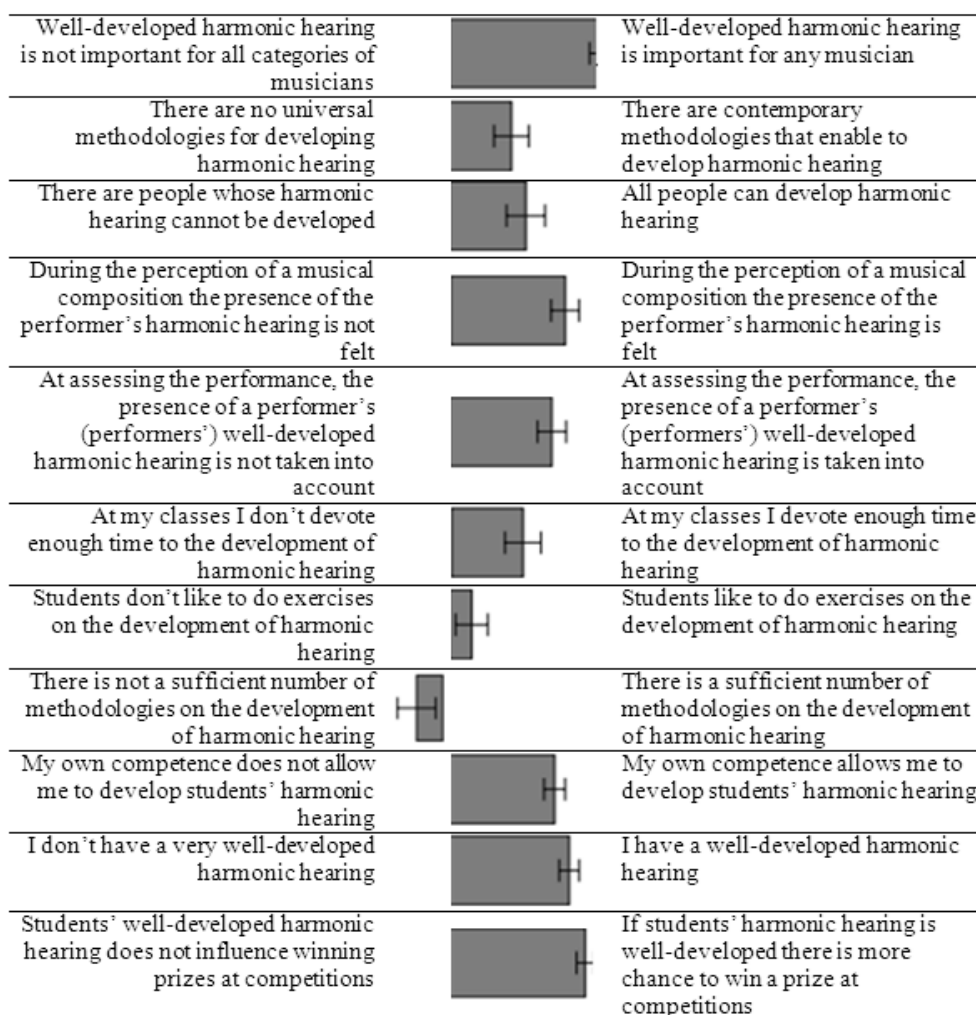


Figure 1. The indicators showing the attitude to the development of harmonic hearing (N=121).

Figure 1 provides information about respondents' attitude to the development of harmonic hearing. It shows the respondents' average assessment of the given statements, which in general bespeaks of their conviction – harmonic hearing is an essential indicator of music teachers' competence. However, the teachers admit that pupils do not like exercises on the development of their harmonic hearing. This involves the necessity of developing such methodological materials which would stimulate pupils' interest and enhance motivation to do such exercises. The majority of respondents acknowledge that they do not devote sufficient time to the development of harmonic hearing during their lessons. The survey data also indicate to the topicality of the research on harmonic hearing development and the need to qualitatively improve the methodological part of music classes oriented towards harmonic hearing development. Interval hearing is one kind of harmonic hearing, therefore the results obtained in the pilot project also consider the problems of interval hearing.

### The comparison of contemporary methodologies worked out for developing interval hearing

**Work on the Development of Interval Hearing.** With good reason, interval hearing is considered a key skill within the system of sol-fa skills. It is usually assigned a special place in all sol-fa courses. The formation of interval hearing requires such skills as: ability to perceive intonations formed between definite sounds; correct intoning of one of the voices in a two-voice sounding.

Traditionally, two approaches to the development of interval hearing are distinguished: mode and extra-mode. When a mode approach is chosen, sounds are identified (during a dictation or auditory analysis) on the basis of a mode support and the correlation of sounds with their surroundings. Identification of an isolated interval, out of the context of a mode, takes place by means of correlating it with the so called "pattern" or a certain standard kept in memory.

**Work on Melodic Intervals.** Melodic intervals are acquired by intoning. L. Maslenkova (Maslenkova, 2003) maintains that at working on an interval we should bear in mind the fact that intonation is created as the result of interaction between metro-rhythmic and syntactic conditions. Interval-movement is a mode entailing intonation inside a syntactic unit – a motif (with a support on a sense of mode). Interval-switching over is formed of two sounds which belong to different syntactic units (intonation is as if “disrupted” by a caesura). For a melodic interval, the nature of intonation is essential. The ability to accurately sing in any direction tones, as well as diatonic and chromatic semi-tones, is the basis on which a correct, precise intoning of all intervals can be built. Ascending and descending melodic intervals differ in manner of performance. Descending intervals are more difficult to perceive and therefore they need more time for reinforcing the skill.

Learning intervals – melodic and harmonic – occur in a mode and from a sound as well. Learning intervals in a mode contribute to the development of a precise intoning, to a flexibility of musical ear. The basic forms of work on intervals may be as follows:

- mode-intonation work – intoning scales (singing scales in parallel thirds and sixths), intervals (in groups, in duet or with one voice accompaniment on the piano), sequences;
- sol-fa – practicing unfamiliar melodies from the sheet as well as simple songs, romances;
- metro-rhythmic exercises – performance of a rhythmic pattern at performing interval chains;
- auditory analysis – identifying intervals and interval sequences by ear, analysis of musical fragments by ear;
- music dictation – oral, written, with the analysis and without a preliminary analysis. (Figure 2).

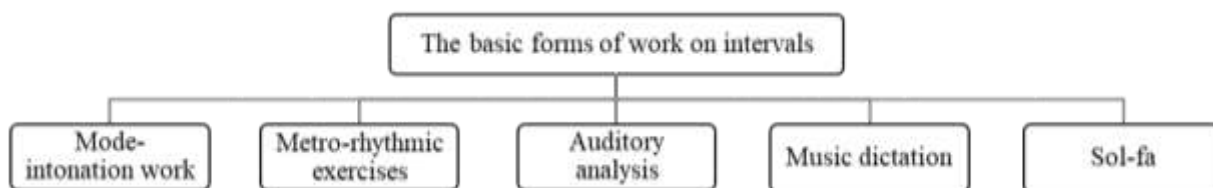


Figure 2. The basic forms of work on intervals.

Learning intervals in a mode takes place gradually:

- connected singing of two degrees; it is recommended to begin intoning intervals in a tonality with a consonance and dissonance no broader than the fourth; gradually the degree size of intervals widens, the attention focuses on intoning different kind of unstable consonances and dissonances;
- singing of one interval on different degrees with resolving and without it; all intervals should be resolved – discarding and according; this contributes to the development of a controlling ability of ear and also the expressiveness of intonation is achieved.

A successful acquiring of intervals depends not only on correlations between mode degrees, but also on the fact that there are difficulties with their correct intoning. At alternating descending intervals with ascending ones, singing becomes melodically conscious; moreover, not only one of the voices is heard, but both voices of the interval sequence are heard. At this stage, skills of acquiring all intervals via singing and auditory fixation are being gained. A. Vurma and J. Ross (2006) maintain that intervals of the fifth and the triad are intoned less precisely than those of the second.

On the basis of our long experience of developing interval hearing, we offer several practical exercises for inner perception about resolving unstable mode degrees, and gravitation of unstable degrees towards stable ones, which create the sensation about a tonic as about the centre of a mode:

- to sing scales aloud, to oneself, from different degrees, alternating the progression up with down. For example, to sing the scale G-dur up from degree III; down – from degree IV; up – from degree VI; down – from degree V etc.;
- to represent a definite sound by different degrees of tonality, to lead the melody of the exercise to a tonic, and to sing a basic triad in the end;
- to sing a resolution of alternated unstable degrees in stable ones;
- to sing stable degrees with alternated unstable degrees.

The degree perceptions are formed much easier and faster than those of intervals, and when interval perceptions are being formed, the degree perceptions play the role of some corrector of their accuracy. Thus, we can state that the formation and development of degree perceptions are the basis for the development of the sense of mode and, consequently, of interval hearing. Learning melodic intervals from a sound enhances the formation of a contrastive perception about them. The interval is recognized by ear as such, independent of in which meaning of a mode it appears (Hargreaves, Miell, MacDonald, 2012). This is especially vital at studying music of the 20<sup>th</sup> century, where under the conditions of an extended composition the structure of the interval becomes the decisive factor.

Singing and the analysis of intervals by ear from any sound is most successful in cases when a mode “environment” is missing and the linking sequence of intervals is based on the principle of overcoming the inertia of a traditional classical mode (for example, the sequence of the third, sixth, fifth, fourth). For learning intervals from a sound, L. Maslenkova (Maslenkova, 2003, 73) offers the following algorithm of actions: 1) Every interval is sung a number of times; 2) Every interval is sung by repeating the initial sound; 3) Every interval is sung by repeating the initial sound “to oneself”; 4) Sounds are sung one after another; 5) For performing the interval sequence, a definite rhythmic formula is chosen; 6) A learner is offered to perform the interval sequence in a free improvised rhythm and measure.

Practical recommendations for the development of interval perceptions as correlations between the degrees of a mode might be as follows: in the chain of intervals, to sing the lower voice by degrees, write it down, then sing the upper voice by degrees, name the intervals; in the sequence of intervals, to sing and identify by ear melodic intervals in the upper and lower voice; to play the interval, and a learner sings only its resolution; in the interval, to sing one voice, but to play the other; from the given sound, to build the first interval mentally, the second – aloud; any next interval is sung from the initial sound of the previous interval; from the given sound, to build several intervals mentally, but sing the last one aloud.

Since the semantic range of the interval “out of the mode context” is extremely great, the characteristics of every interval at studying it must not be imaginative-concrete. M. Karaseva (1999) has developed a methodology for learning intervals in an integrated way (i.e. synesthetic way), based not only on auditory, but also on visual and kinaesthetic sensations. However, these sensations are exclusively individual; learners will sense and comprehend the interval each in their own way: the generally recognized features – distance between tones (width/narrowness) and their harmony (consonance/dissonance) – may be supplemented by new indicators emerging in the result of work of all sense organs. The analysis of one’s own reactions enhances self-knowledge about the mechanism of music perception and shows that the interval is being learnt within the context. Interval hearing is being developed gradually on the basis of auditory experience. Listening to an unfamiliar sequence of intervals always involves its comparison with the familiar ones, with those that have sounded before, ear detects the contours of intonations mastered before. This is why the development of interval hearing is an integral part of a professional music education.

**Work on Harmonic Intervals.** Harmonic intervals have a certain timbre shade. When learning harmonic intervals, auditory attention should be focused on a phonic base. Therefore, at learning and acquiring harmonic intervals, the interval has to be treated as a consonance having timbre and functional characteristics, as one of the means of developing harmonic and timbre hearing. In the auditory analysis, the phonic qualities of intervals are characterized by the principle of contrast. Learning intervals by ear must be gradual, by stages. For this purpose, we recommend to use as the basis the part relating to intervals from Model of the Development of Harmonic Hearing by G. Zavadzka (Zavadzka, 2012). First diatonic and characteristic intervals are acquired, then – chromatic intervals. The succession recommended for learning intervals may be as follows: 1) intervals different by their timbre characteristics; 2) spatial characteristics of the interval, degree of the distance between two intervals; 3) associative perception of interval sound colour; 4) acquiring a tonal value of the interval.

Pedagogical practice shows that after separate intervals and degrees have been acquired (which is a time and labour consuming process) students can start learning blocks of intervals. The better the sense of degrees is developed, the more successful the formation of the sense of interval mutual relations and the development of auditory perceptions about intervals are. L. Maslenkova (2003) recommends keeping a fast working pace at learning intervals. Certainly, a fast working pace promotes the mobilization of

attention; however, the specificity of knowledge and skills of a specific learners' group, their reaction speed, their musical memory and abilities to concentrate attention must be also taken into consideration. Therefore, at teaching intervals, it would be recommendable for a teacher to take into consideration learners' abilities in the specific group as well as the specific situation during a sol-fa lesson when the working pace is chosen.

### Results of surveys

In the process of studying the level of development of children's interval hearing, a survey was conducted and its sample consisted of teachers who are related to the methodology of teaching music at school (Zavadska, Davidova, 2013). The study was necessary to find out how important, according to the teachers, the development of harmonious children's hearing is, to identify problematic situations and to establish how much time teachers spend on its development in the classroom (Rauduvaite, 2018). As American researchers state, well-crafted questions lead to new insights, generate discussion, and promote the comprehensive exploration of subject matter (Tofade, Elsner, Heines, 2013). Questioning also provides the student with a model for learning; we learn by asking ourselves questions, consciously or subconsciously (Hannel, 2014).

From 2013 to 2015 a study on development of harmonic hearing (including interval hearing) on the basis of a diffusive group of students of the study programme of music teacher training was conducted at Music Faculty of University of Daugavpils (Zavadska, 2015). The research was carried out in three directions:

- perception of intervals and chords by ear, activating associations;
- analysis of the perceived harmonic vertical, defining its theoretical concepts, as well as determining the analogy between the visual images of intervals and chords and their characterizations;
- musicking of simple polyphony forms during individual or collective musicking, implementing in practice the inner perceptions of polyphonic musicking (by singing, playing, composing the accompaniment, arranging).

Sixty respondents – music teachers from Latvia, Lithuania, Estonia, Belarus and Finland – took part in the first pilot survey. The results of pilot research survey were analysed using SPSS 19.0 program. Mann-Wittney Test and Kaiser-Meyer-Olkin Measure of Sampling Adequacy were also applied (Zavadska, Davidova, 2013). The analysis of the received results showed that the average age of the respondents was 43.5 years: the youngest respondent being 25 years old and the oldest one – 63 years old. The respondents' pedagogical experience ranged from 1 to 44 years with the statistic mean being 20.5 years.

During 2018 to 2019, nine students of the DU Music and Arts Faculty took part on study of their interval hearing. The components of work on interval hearing, such as singing and listening to harmonic and melodic intervals, are also involved in this process.

Tests given during the semester included such tasks as:

- 1) to write down by ear blocks of different intervals, which include diatonic, characteristic and chromatic intervals in natural, chromatic major and minor keys with resolutions;
- 2) to emotionally characterize (from the position of phonics) the given small interval sequence (intervals with inversion in natural and harmonic major and minor keys);
- 3) to improvise in different genres (polka, waltz) small melody fragments including the acquired intervals and do it together with a teacher (in a dialogue form);
- 4) to sing in ensemble a pre-prepared two-part or three-part exercise chosen by a teacher.

The positive results of the work on the development of interval hearing are confirmed by the students grades for four semesters presented in Figure 3. Grades are summed for all 9 participants and calculated as a percentage of the maximum score (54) for each indicator.

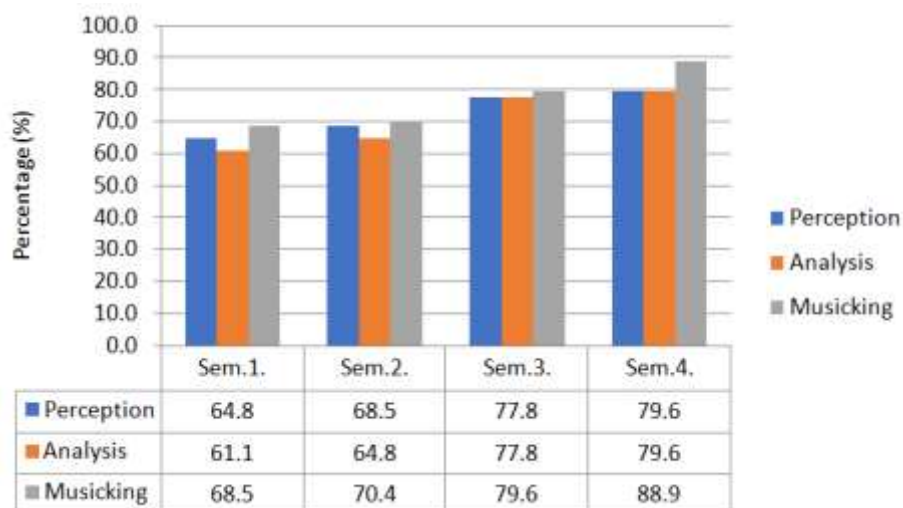


Figure 3. Dynamics of results about the development of harmonic hearing (for the group in total, where n=9).

A stable growth of the results was established in indicators *Perception* (64.8 % - 79.6 %) and *Analysis* (61.1 % - 79.6 %). The analysis of final assessment results in the direction of *Musicking* showed that *Improvisation* had been the most complicated form of work; the most stable indicators of the development were shown in a *Polyphonic Singing* form of work (68.5 % - 88.9 %) (Figure 3).

Analysing the results of indicators of harmonic hearing development (including interval hearing) in the group of remote-control students, the increasing positive dynamics can be identified, which confirms the correctness of the chosen method.

On the basis of pedagogical experience the authors of the paper suggest several recommendations for identifying and representing phonism of intervals, and training the speed and stability of auditory reaction: to play one and the same interval in different octaves and from different sounds on the instrument; to learn the interval from known melodies at first; to sing identical intervals up or down from one and the same sound; to sing the interval as part of a known chord, for example, to sing the minor third from the sound “d” and the major sixth from the sound “f”; to sing intervals mentally or aloud, filling in the space between their base and top; to sing intervals like a sequence of degrees.

To develop their skill of perceiving, analysing and precisely intoning intervals students need knowledge of music theory on the place of intervals in the mode and on how to resolve them. It is useful to introduce any new interval by giving students examples from music literature: these might be fragments from works by composers-classics and from contemporary music as well. Learning intervals is a long and complicated process. The interval may be considered acquired only when it is being intoned precisely.

## Conclusions

- Work on intervals allows simultaneously activating many processes of auditory, visual, vocal, tactile, and imaginative perception. The ability to correctly use the acquired knowledge provides the opportunity to obtain and develop interval hearing, i.e. deliberate interval perceptions.
- The process of work on the development of interval hearing takes place by stages: first diatonic and characteristic intervals, and only after that chromatic ones are learnt.
- The basic forms of work on intervals may be as follows: mode-intonation work – intoning scales (singing scales in parallel thirds and sixths), intervals (in groups, in duet or with one voice accompaniment on the piano), sequences; sol-fa – practicing unfamiliar melodies from the sheet as well as simple songs, romances; metro-rhythmic exercises – performance of a rhythmic pattern at performing interval chains; Auditory analysis – identifying intervals and interval sequences by ear, analysis of musical fragments by ear; music dictation – oral, written, with the analysis and without a preliminary analysis.

- Although being a minimal bearer of intonation by its size, an interval is the most significant semantic element in music. One and the same interval can be interpreted differently depending on the context (on mode, rhythmic, texture, dynamic, timbre conditions for materializing a musical image).

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