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Intoning Compositional Elements of Music
(Part 2)

Abstract. The text presents the second article of a series of publications where we discuss the possibilities of applying the principles of communicative speech intonation to the grammar of music composition. The first article (Mickis 2021) introduced the concepts of intonation codes and types of groove entrainment, while in this one, these concepts will be modeled with the categories of musical practice (basal/developed, solo/ensemble, and closed/open). For this, three dimensions of intonation (horizontal, vertical, and spatial) are derived into three composition levels: the resulting spectrum, composing style, and the essential elements of musical structures. For the style of composition, the attributes are formulated listing the taxonomy of eighteen intonational codes, beginning with the expression of rhythm duration, and finishing with the extended articulation of complex counterpoint textures.

The article provides cognitive groundings for each intonational tool, offering the basis for rethinking the composing practices based on the most notable studies of intonation, music perception, and entrainment habits. The methodology's practical value lies in its ability to address open and closed intonation of compositional elements (such as closed/open meter, pulse, tonalness, and stream spectrum). Yet, in a more profound sense, it provides an alternative to tonal, dodecaphonic, set, and formulaic approaches in composition by introducing concepts of intonation and grammar.

We concluded the first part of our study (Mickis 2021) with a theory section, which culminated with a discussion on what knowledge would be needed in order to develop the postulated environment of intonation in a composition. In this part of the publication series, we will explore the application of theoretical knowledge to the tools of musical composition, producing intonations of rhythm, tones, and stream.

Keywords: intoning, musical parameters, entrainment, compositional tools, creativity.

Introduction

As we thoroughly discussed in the first part of this study (Mickis 2021), there are tight connections between musical entrainment and speech intonation codes, which can be summarized into the following table (table 1):

Speech			**Music**	
Code	Intonation	Intention	Entrainment	Intention
Frequency	Low	Dominant	Regularity	Dominant
	High	Subordinated		Subordinated
Effort	Narrow	Nominal	Differentiation	Solo
	Broad	Empathetic		Ensemble
Production	High/Broad to Low/Narrow	Closed	Cyclicity	Closed
	Low/Narrow to High/Broad	Continuous		Open

Table 1

The names of the spoken intonation codes and their values are presented in the table as originally provided by Cross and Woodruff (Cross and Woodruff 2009, 120–121). The intention column is adapted by the article's author for musical intonation. The definitions borrowed from Cross and Woodruff (ibid) are, in terms of this system, quite streamlined and relate more to the observations of practice (e.g., how speakers dominate their communication) rather than to systemic insights. The assumptions for assigning music entrainment to speech codes are described in the theory section, but it can be briefly recalled that:

- *Regularity* refers to the intention of dominance/subordination, both according to the primary position in the hierarchy (frequency is set to the first code, so is a regularity to the first entrainment) and due to the complementary nature of dominance—subordination: for any sound event to dominate, it is necessary to subordinate all the surrounding ones, thus, to realize regular interchange between dominance and subordination. If the series of sounds are of equal pitch, duration, and strength, it could be said

that anticipation for the forthcoming dominance is evoked, e.g., dominant intonation is delegated by the composer to the listeners' imagination.[1]

- *Differentiation* is attributed to the *effort*: 1) by its position in the code and entrainment taxonomies (they both come in second in their respective taxonomies) and 2) by its complementary nature: solo and ensemble expressions (i.e., distinct and fused, or dissonant and consonant) are not mutually exclusive, as are nominal or empathetic efforts. Empathetic (honest) energy is attributed to ensemble entrainment due to the required effort to form a harmonious sound environment. On the contrary, the solo is intended as nominally separated from the sounding whole. (Nominality of the latter is considered the characteristic timbre of the chosen solo instrument, regardless of the context of the ensemble sound.) Moreover, the effort is linked to the solo/ensemble dichotomy to achieve a universal criterion for the time and pitch of a composition. For this, the honesty of effort in the composing environment was considered, whether the selected attribute supports the wholeness of the overall sound vs. stand-out and independent solo parts.
- Both the production code and the entrainment of *cyclicity* involve combining. The production code links frequency with the effort intonation, whereas the cyclic entrainment fuses regularity and differentiation. Furthermore, for music composing, a combination of the dominance and solo intones closure, while the subordinate ensemble (supporting closed intonation in the solo part) conveys an open entrainment.

After establishing the initial correlation between speech intonation codes and their corresponding musical entrainment counterparts, the study sought to investigate the extent and definition of musical features that can be applied to these intonations. The threefold structure of the latter presupposes the option of aspects of musical language. In our doctoral thesis (Mickis 2018), we created a three-dimensional vector system using a multi-level principle of the composition evolution based on the TRIZ theory of screen environments (Orloff 2017).

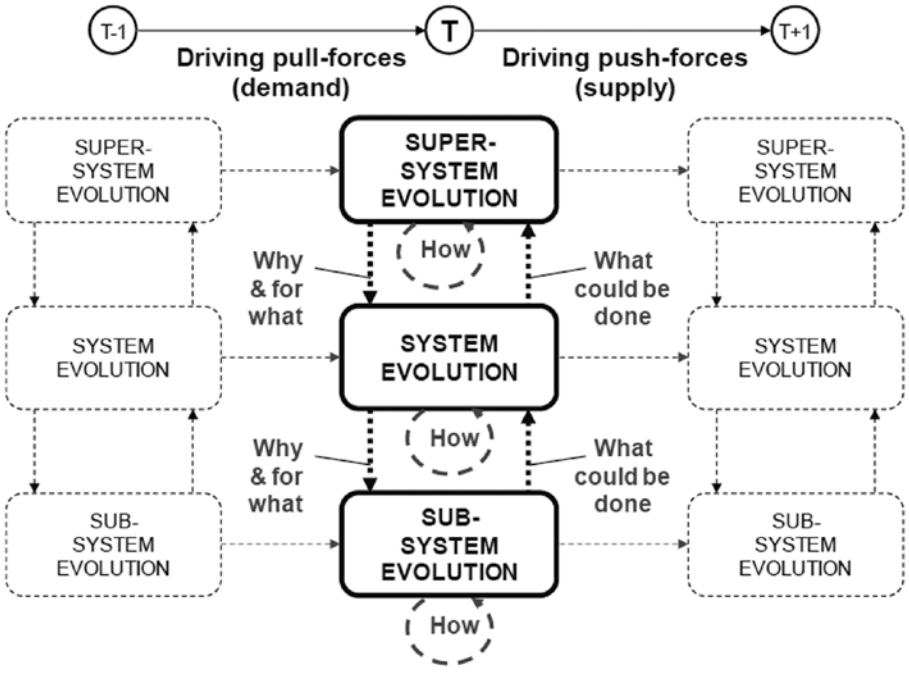

Figure 1. Evolution levels of the TRIZ system (Orloff 2017)

[1] The reason for such anticipation of the future emphasis lies in the economy of perception, in that if there are no changes in the sound surface, the background is perceived without details, and similar events are merged; thus arises the expectation of outstanding events, a constant vigilance in anticipation of the unexpected. Such a mechanism of the perceptual economy and uncertainty of distinctiveness is reflected in various angles, such as in Meyer's (Meyer 1961) emotion as a response to change and in Keller's (Keller, Gruber, Bradshaw and Meixner 2001) background–surface concept.

In the methodology illustrated in figure 1, each higher-level screen necessitates a lower one, where the super-systemic level of insights provides the most general aspects. Three intonation entrainments for this super-systemic level should be described, two of which could be associated with Thompson's sensory dimensions (Thompson 2008), namely, the rhythm (of durations) and tones. Therefore, we attribute *regularity* entrainment to rhythmicity, which is responsible for intonation in time. Tones in such a projection would *differentiate* the rhythmic pulsation of the intonation, extending expression starting with percussion timbral intoning, all the way to harmonic (free) counterpoint.

The third entrainment (cyclical intonation of the super-system) is somewhat more complicated, as it should incorporate the previous two. This third pre-perceptual dimension is based on research regarding contour perception, which addresses the simultaneity of rhythm and tonal change (ibid). In the concept presented in this article, we can rely on the functionality of the *formant rhythm* (Stockhausen 1959) and attribute it to the *stream*, which defines the voices of the composition that perform a unified intonational function, while varying from open to closed. It is important to note that the stream is characterized by structural accents and filling the gaps between them (just as discrete tones form a continuous timbre). We choose the term stream for two reasons. Firstly, formant rhythm has a dual nature and is less focused on rhythmicity and tonalness (perhaps only spectral composers think about harmony as an expression of harmonic spectrum). Secondly, timbre is more often associated with static sound characteristics of the instruments and is rarely linked to the intonational interaction between time and pitch.

Thus, it is appropriate to distinguish rhythmicity, tonalness, and streams in a super-system intonation of the overall sound. At lower levels, according to the threefold concept, each entrainment acquires further dimensions of intonation:

Entrainment	**Intention**	**Intonation**		
		Of rhythmic regularity	Of tonal differentiation	Of stream cyclicity
Dominant **Regular/ of time** *Subordinated*	Basal	1. Line of short rhythmic durations	2. Reversal melodic archetype	3. In low register
	Elaborated	4. Accents of long rhythmic durations	5. Processual melodic archetype	6. In high register
Nominal **Differentiated/ of pitch** *Empathetic*	Solo	7. A pulse separated dissonantly	8. Harmonic base	9. Contrasting solo
	Ensemble	10. Pulses aligned consonantly	11. Melodic embellishment	12. Complementary ensemble of streams
Closed **Cyclic/ of contours** *Open*	Closed	13. Cadence in distinctly-dissonant line	14. Reversal leap toward harmonic tonal alphabets	15. Contrasting solo with articulation and register characteristics of the instruments
	Processual	16. Development in accents of consonantly aligned pulses	17. A processual step towards unstable melodic alphabets	18. Complementary ensemble of streams with extended articulation and register of the instruments

Table 2. System level intonation entrainment (S. Mickis)

In table 2, we can see eighteen horizontally and vertically interconnected composing intentions. Marked vertically are the pre-perceptual dimension values corresponding to the choices of compositional elements (e.g., *line* or accents in rhythmic durations). Then, the intonational realizations of these elements are indicated horizontally (for example, a section of short durations replaced with the sequence of long accents). The result of such intonation can be understood as 1) the intonation of time with rhythmicity, 2) the differentiation of the latter with tonal attributes (e.g., isorhythm), and 3) a combination of the first two into the expression of a unified stream (such as melody or accompaniment). The latter are marked with a gray background in the table. When examining intonation, it is important to note that regular intentions can alternate between basal and elaborated expressions. On the other hand, differentiated intentions complement or modulate regular ones, whether nominally or empathetically for the listener. The context of the sound can lead to a re-interpretation of the differentiation: an empathetic intonation can become nominal in retrospect (due to the already mentioned listening economy).

Combined closed intonations (cyclic entrainment in table 2) tend to be intoned according to the first options of regularity and differentiation (e.g., intonations number 1 and 7 combined into number 13), while open intonations tend to be produced with the second options (e.g., 4 and 10). The italics in the first column recall the original intonation codes of spoken language (Cross and Woodruff 2009, 120–121), giving additional connotations to the musical narrative. Since the ultimate goal of intonation concerns the totality of the sound (not differences in rhythmicity, tonalness, or stream), the following discussion of intonation is spread horizontally, intoning and blending time with pitch into streams.

The presented theoretical framework is derived in a very condensed form; an extended discussion of the sources and premises underlying the concept is given in the previous issue of PMC (Mickis 2021). For now, let us begin with the time intoning in composing.

Time intonation: entrainment of regularity

Alternating intonations 1 and 4 (see table 2) are chosen based on Fraisse's dichotomy of long and short durations (Fraisse 1982); the eighths (according to Fraisse, *temp courts, tc*, nominally corresponding to the 8th at MM75 with a duration of 400 ms) are experienced as a sequence of indefinite time intervals (we will call this intonation the *line*[2]); and the quarters (temps long, *tl*, lasting 800 ms at MM75) is perceived as distinguishing, definite durations, accents. If such an accent occurs within the sequence, it can be said that the long-duration accent is subordinate to the overall expression (accents would not happen without the line being established). Therefore, the first intonation of the rhythmic regularity indicates the possibility of development with long-duration accents:

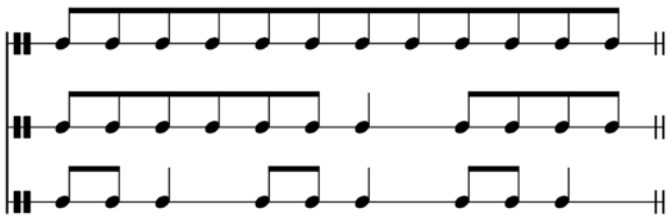

Figure 2

As can be seen from figure 2, the regularity of time happens in the third staff due to accents. For the sake of objectivity, it is worth noting that the intonation of a sub-system shown here only involves changes of duration (rhythmic lines, for example, can be a complex phenomenon, potentially implied with pulse and meter intonation). Due to the limited scope of the article, these sub-system entrainments (actually, composing means) are not presented. However, they have been formulated by the author (and may await a separate monograph), therefore, the intonations of table 2, shown here as "black boxes," are treated as currents of sound (but not compositional techniques). For instance, the current of the intonation codes 1 and 4 shown in

[2] This and many other cognitive findings were explained using the excellent book by Ambrazevičius (2017).

figure 2 can be differentiated by applying tonal changes, using fixed (discrete) pitches in the scale (e.g., accent could be implied with the different pitch in the otherwise uniform context of the tonalness).[3]

The temporal expression of tonalness (that is, how the changes of tones in a melody are differentiated) is based on Narmour's concept of process and reversal (Narmour 1990), which is, in turn, related to the so-called trill threshold (Miller and Heise 1950) that is equal to 242 cents (an interval between a major second and a minor third). The intonational effect of this phenomenon is analogous to Fraisse's *tc/tl*, only in the domain of pitch. If the difference between the intervals in a sequence is not greater than a major second, the entire sequence is experienced as a line. On the other hand, if the difference of the two subsequent intervals reach a third or an even greater interval, the second interval is more likely to be perceived as separate melodic leap. Although Ambrazevičius (2017, 45) notes that this phenomenon is also related to durations (the trill threshold widens at rhythmic accents), we would like to note that the dominant differentiation is perceived with the wide (beyond the trill threshold) ratio between the intervals coinciding with the register direction change (denoted by Narmour as *R*, see figure 3 below), while processual intonation is best invoked with a unidirectional and narrow ratio (with the difference less than the trill threshold) of intervals in the sequence (denoted as P in Narmour's works).

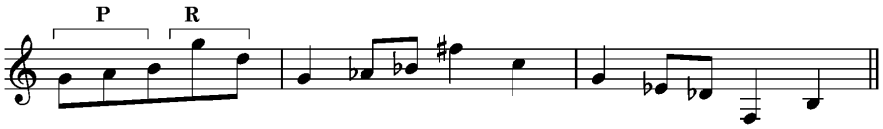

Figure 3

In figure 3, the first measure presents an intonation with exclusively tonal differentiation (with a line of short intervals, so the leaps are selected well above the trill threshold). By tonally differentiating the time, regularity occurs with a coordinated change in the melody's development subordination to the dominant cadence (at R). The second bar shows the intonation of rhythm and tonalness, realized with the stream in the upper register. This stream is subordinated to the first tone (G4), where the rhythmic accents (quarter notes F#5 and C5) further separate the already wide (accented sounding) intervals. Finally, in the third bar, the stream is intoned toward dominance (code 3) of the lowest register tone F3 (i.e., register accent, more potent than the initial G4). Thus, a regular stream change in bars 2–3 is achieved, which coincides with the axial contour archetype, defined by Gestalt.

If the composer decided to abandon the subordination of regularity (i.e., intention codes 4, 5, 6), a dominant intonation of rhythm, tonalness, and stream without any perceptible regularity of time would result in the expression of a static sound, usually referred to as *sonor*:

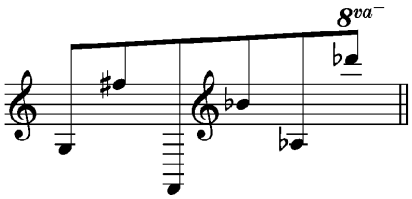

Figure 4

In figure 4, despite the high-register tones, the combination of different registers will be perceived as non-directional, hard to distinguish in terms of height, blurring the time-evolution of the stream. One reason for such amorphous intonation could be attributed to the phenomena Lawrence W. Barsalou called "symbolism of size" (Barsalou 1999); if the prevalent intervals in a sequence are wide and even wider relating to the size of

[3] For instance, the means for the production of accents in music composition are covered in numerous publications, for example, by Lerdahl and Jackendoff (1993), grounding the instances of metrical accents that yield changes in grouping, also, as a similar function for grouping cell establishment due to phenomenal accents exemplified by Ambrazevičius (2017, 148). All similar concepts relate to the temporal aspects of the musical sequences, thus supporting the time intonation intentions advocated in this article.

the register (one octave),[4] they all symbolize dominant reversals, never subordinated to the processual archetypes, and therefore are fused into a never-ending scope of "big" changes. As we already discussed, dominance cannot be established without the subordinated counterpart. Although, at first sight, such intonation could be defined as non-differentiation of rhythmicity, tonalness, or stream, we already mentioned that the intention of regularity (that is, the intonation of time) has a distinctive character that should be defined as structural, i.e., intoning the boundaries of rhythm, tonalness, or stream with long duration vs. short, processual archetype vs. reversal, high register vs. low, stream vs. sonority, and as such, the totality of intonation in figure 4 could serve as a basis for further differentiated intoning.[5] As we shall soon see, the latter is not characterized by a dualistic dominance/subordination nature and could execute variation of time intonation with pitch.

Pitch intonation: entrainment of time differentiation

Pitch intonation appears to be different from its temporal regularity, the latter possibly being described as discrete (dominance–subordination dualism), while the former is different to continuous changes. The reason for this lies in the auditory imagination, more precisely to its artifacts, *auditory illusions*. In the rhythmic domain, such an illusion is related to the perception of beats, a moment with no duration (Ambrazevičius 2017, 135). Any change in such context also changes the experience of beats. For example, a solo or ensemble function of a pulse (i.e., a tonally undifferentiated stream of beats) may vary due to changes in the pulsing content rather than of durations:

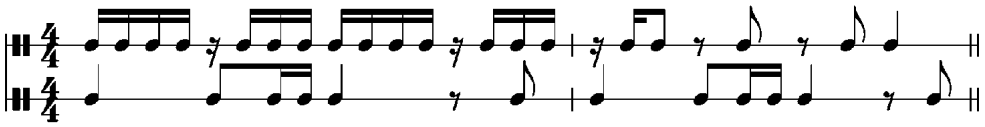

Figure 5

In figure 5, the lower stave uses three different durations to form a repeating contour (until the pause). Meanwhile, in the upper stave, pulsing changes occur—we can see a transformation from the line (in the sixteenths of the first bar) to the accents in the second in a continuous manner, slowing down due to increasingly longer durations of both the sound events and the rests between them. As the first-bar contour in the second staff also rises to the pulse of sixteenths, the sound blends between the two instruments and intones an ensemble of a unified entrainment. Finally, in the second bar, the accents of the upper stave detach from the second stave's contour, partly due to distribution by quarter note interval (in the first stave, no duration is duplicated), partly due to the displacement of the beats by an eighth note. The latter issue, called dissonance (see table 2, code 7), is associated with Parncutt's pulse salience concept (Parncutt 1994).

Parncutt (1994, 442) presents several types of rhythmic dissonances (B—a syncopated shift already shown in figure 5, A—polyrhythms between beats). Still, for the proposed methodology, it would be more appropriate to take a look at the opposite—consonant intonations (see table 2, code 10)—that arise because of two reasons presented in figure 6.

Consonant intonations may arise because of phenomenal accents corresponding to any intonation of regular intention (e.g., from line to accent, from change to development archetype, from low register to high and vice versa), or, as shown in the example, because of the durational accent of the distance between pauses. The latter case is particularly fascinating: it focuses a stronger emphasis on silence, which creates the expectation of forthcoming sound, but it does so retrospectively. If the third sound did not occur in staff a), the

[4] Narmour (1990) relates a wide interval (within the domain of Western modal music) to the inversions of narrow, basic intervals (i.e., 2nd to 4th), starting from the so-called threshold interval (5th) and wider, which is valid only for the middle octave of the piano register. In the presented concept, the interval's width quality is related to the phenomenon known as *critical bandwidth,* which could be inquired from the difference between tones' frequency in Hertz: the interval to be perceived as being wide when the difference shows more than 100 Hz (see the methodology of the calculation in Ambrazevičius (2017, 16)). Also, consult the details in the first part of the article in PCM XXI (Mickis 2021).

[5] To taste the power of pitch differentiation (as opposed to the tonally differentiated regular entrainment) imagine the material in figure 4 reiterated in another register (possibly, a significantly lower one), thus implying nominal (solo) intoning out of static sonorous stasis, in addition, probably suggesting to listeners retrospectively to rethink the intonational meaning of the first figure (4) for its structural meaning, although we defined it previously as undirected in time.

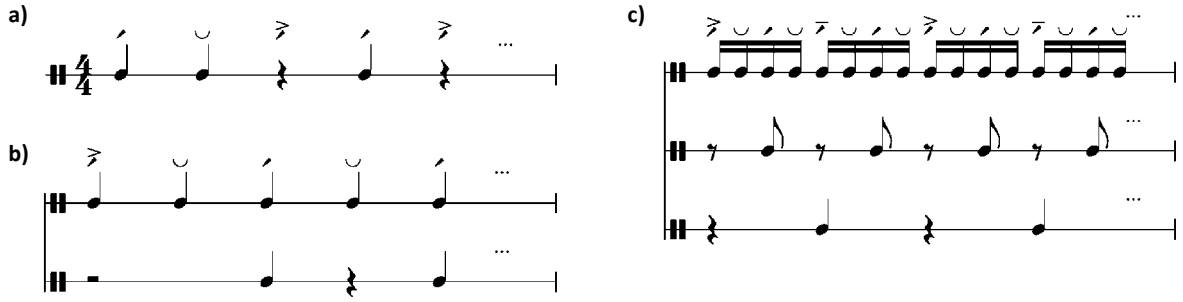

Figure 6

consonant accents of the first and third pauses would also be missed (shown as stress with accent articulation in figure 6 a)). We will soon see that analogous prospective and retrospective intonation is also characteristic of tonal differentiation. Here, however, we will simply note that the consonant prominence of pauses is caused by coordination with sound events, thus it is an ensemble of sounds and pauses.

Systems b) and c) present the extension of consonance postulated by Parncutt (1994, 455) in combination with other pulses. It can be seen that the principle is analogous to case a); only the combination is performed vertically (between voices) therefore, single sounds become more consonant. Version c) illustrates the diversity of levels of differentiation due to the immense number of matched pulses, in agreement with the continuous, theoretically infinite multileveled pulse differentiation. Example c), which relates pulses of multiple difference (upper in sixteenths, middle in eighths, dissonant in syncopation to the lower, half pulse, but consonant with the upper one) showing the pitch intonation of the percussive sequence based on the so-called dynamic attention theory (DAT, quoted from Ambrazevičius 2017, 157).

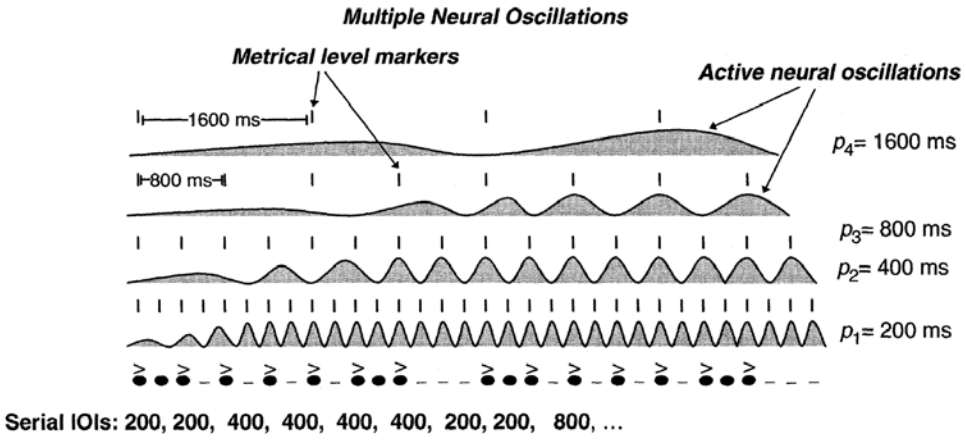

Figure 7 (Jones 2016, 129)

The ringing rhythm is shown in figure 7 with stemless notes at the bottom. Its multiple overlaps in the unfolding experiences of different oscillations evoking a sense of pitch. Although the highest pulse in the presented example relates to *tactus* (at 2/4), the latter is more likely to be nominal, providing the basis for the attention to rise towards the experience of higher (faster) pulses, empathetically drawing the listener into the multitude of speed differences. Both the phenomena of salience and pulse pitch, recurring cyclically, bring together metrical emphases (on the rhythm events matching the upper levels of neural oscillations in figure 7). In this way, we can identify the intonations of rhythmic durations (salience), pulse pitch, and metric periods forming the levels of systematic rhythmic differentiation shown in table 2 (7th and 10th entrainment codes), where rhythmic events, coinciding only with the p_1 level in figure 7, entrains into ensemble empathy (i.e., represents the most consonant salience, just as in the staff system c) of figure 6).

The formed regularity of the pitch in a sequence, alternating rhythmically between a separately dissonant solo and an empathetically consonant one (not necessarily conforming to the metering cycle), can be differentiated tonally, distinguishing a harmonic basis or a melodic embellishment. The ambiguous manner of the definition indicates that the intonation codes with the white background in table 2 must not necessarily be included in a composition, whether at the system or sub-system levels. For instance, rhythms may be deliberately unmetered, and different multiple-rate pulses may not be used (but micro-rhythms might be applied instead, such as tuplets). Analogously, reversal archetypes (leaps with a subsequent change of register direction in the melody) can be excluded from the tonal intonation of the regular entrainment, as well as the differentiation of harmonic and melodic intentions. The latter phenomenon is also complex; therefore, we shall illustrate it schematically (see figure 8).

Let us assume that the pitch differentiation of rhythm regularity is related to the stability of beats; in that case, their retrospective reinterpretation responds to the changes of sound context. Accordingly, the ambiguity of the tonal differentiation for the pitch intoning is implied with the retrospective exchange of process or reversal archetypes, or a mutation of either to the third quality, or even a registral return. Let us evaluate:

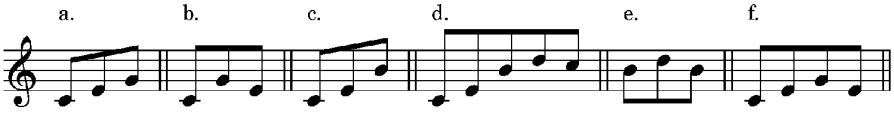

Figure 8

In figure 8, the processual archetype is employed by extending a narrow interval with an interval of comparable size, not wider than the trill limit (up to the major second) and of the same direction, as shown in figure 8a (both intervals are of the same size, thirds). If the melodic direction changes when the first interval is wide,[6] and the following interval size is above the trill threshold,[7] regular (classical, or, according to Narmour, the *perspective*) chain of archetypes occurs, conditioning a regular entrainment of the melody. In all other cases, such boundaries between the melodic process and reversal are blurred, they are continuously changing retrospectively of the previous and new trajectories of the melody reassessment. Narmour calls such a conditional reinterpretation *retrospective* and postulates—based mainly on the analysis of examples—that a retrospective reversal is possible when the size difference of adjacent intervals is greater than the trill threshold by one semitone (i.e., equal to a major third and above). For instance, if the first interval is narrow, and the size of the second one is beyond the retrospective threshold, though the directions of both are the same (e.g., in figure 8c), an incredibly open intonation of empathetic melodic energy would be intoned, which could not have been predicted due to the narrowness of the first interval. With each new tone in a chain, this ambivalent situation only deepens, as, for example, in figure 8d: the melody is extended with the near-reversal move (register change B4–D5–C4), but the differences in the sizes of the intervals remain within the limits of the trill threshold. Narmour defines the latter case as a qualitatively new archetype, the *registral return*.

In the example in figure 8e we can see a classic version of the registral return. If we come back to figure 8a and add a similar return, that would result in the usual practice of accompaniment—the chord arpeggio (figure 8f). Hence, the registral return is crucial to the intonation of harmony basis, supporting solo differentiation of the melody in the tonal domain (forming independently from the context harmony chord). However, we shall not explore all the possible variations here, as the abundance of variants supporting harmony is beyond the scope of this article.

Intonation code 8 in table 2 is classified as a solo intention because, typically, the root tones of the harmonies unambiguously dictate the implied harmony. In an alternate case (e.g., in cases of poly-tonality or complex chords like C|Dm), the sound changes to neutral, destroying the energy of the interchange between harmonic basis and melodic embellishment (an effect analogous to the sonorous irregularity of time in figure 4), thus, without intoning codes 8 and 11. On the other hand, it is possible to apply the combination of the latter ones for harmonizing the melody, which could result in a sound of a classical tonal arrangement. In general, the tonal differentiation of intonation (for both time and pitch) manifests the composer's empathy

[6] That is, outside the critical band of the first interval, in figure 8b C4 f=261.63, thus the threshold occurs at F#4.

[7] In figure 8b, the difference between the perfect fifth C4–G4 and minor third G4–E4 equals a major third.

for the listener (or honesty of signal in the original speech intonation setup, see the motivational-structural dimension of communication (Mickis 2021, 32)), in that case, listeners could potentially evaluate the composer's efforts to sound harmonious.

Following the principles of our presented methodology, stream intonation code 9 (in table 2) is combined from codes 7 and 8 to describe a stream of harmonic bases, commonly called harmony voices (or pad) in the arrangement and composed in a specific manner to present harmony types. Accordingly, code 12 refers to the practice known as a free three-voice counterpoint, in which the bass, pad, and melody voices are combined for a harmonious sound in a single homophonic stream. Naturally, various stream combinations are possible, however, as Huron (2001) points out, no more than three competing combinations (the so-called principle of limited density) could be perceived at a time. For instance, a popular music arrangement traditionally uses a three-part bass–pad–melody stream, a contrasting instrumental counterpoint to the latter, and a percussion stream (drum set).

After addressing differentiated pitch intonation, the intention remains to combine time and pitch structures into contours. For the context of intonation, contours that fit into short-term memory are meant to be, nominally, 3–5 seconds in duration. However, the possible time range of the psychological presence for a static intonation (e.g., minimalist texture) could reach up to 16 seconds. Let us look at the practical manifestations of derived contour codes depicted in the bottom two rows of table 2.

Contour intonation: cyclical entrainment of time and pitch combined

Contour intonation codes are responsible for the narrative of the intonation. The latter is often divided into parts of motifs, phrases, sentences, and periods following the linguistical approach. The purpose of the presented methodology is to avoid such methodological borrowings and rely on units specifically applied to music. Such is the Gestalt-formulated outline, or melodic line, whose three primary forms are presented by Snyder (2001, 152):

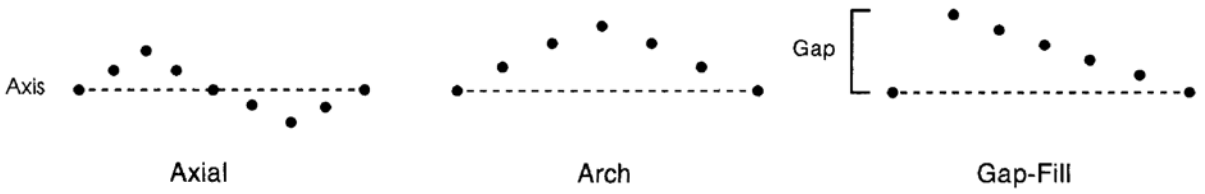

Figure 9

It is relatively easy to implement the visual metaphors of figure 9 into compositional practice, given the pulse intonation and melodic archetypes discussed in the previous section. Therefore, we will present only the specific differences in contour rhythmicity, tonalness, and stream intoning.

Considering the intonation in the sub-system, the variety of rhythmic expressions are gradually directed towards the cyclicity. The change of durations implies the coherence/separation of the pulses, and the beats of the pulses, distributed with accents in the metrical grid, intonating the open/closed directionality of the contour for its rhythmicity:

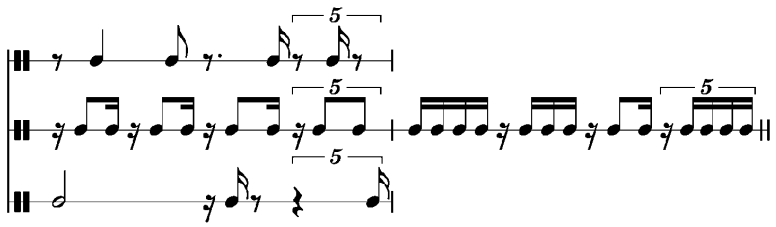

Figure 10

In figure 10, both bars use the same rhythmic framework. Still, the first bar is intoned saliently using code 16 (analogous to the extended intonation of figure 6c), and the events in beats 3 and 4 move away from the pulse of the quarter tactus due to the deviation from the slower, lowest pulse of figure 10. In the second

bar, the intonation is consistently redirected to the dissonant solo line heading to the closed intonation with code 13. Even if different parts of figure 10 are performed in the same percussive timbre, the three performers will differ in micro-temporal intonations, intoning groove in the ensemble. At the same time, a rapid line of a single instrumentalist moves almost mechanically toward the cadence.

Another example illustrating the power of contours for the quality of regularity can be found in the common practice of popular music (e.g., R'n'B or Rock); parts combining syncopations of eighth or sixteenth notes ensures the practical expression of the groove. In such rhythm-based music, tonal differentiation usually serves the function of form organization, e.g., by separating the intonation of the harmonic and melodic whole between verses and choruses. Hence, the benefit of intonation is most evident in popular music and quasi-tonal environments, although it is also applicable in the atonal concept (we will address this when discussing figure 12 further below).

When discussing the contour in tonal differentiation, intonation here appears to be related to the phenomenon of tonal alphabets. The concept of tonal alphabets (Deutsch and Feroe 1981) originates from the observation that in a melodic line, the chords of third triads (of the first-degree chord, I–III–V) can be perceived and articulated as independent, tonally differentiated from other degrees of the scale. Extending the concept of alphabets, Lerdahl (1998) postulates a melodic reversal in tonality by jumping across several alphabets to stable degrees of harmony as an alternative to melodic development. Considering the structure of the intonation codes, it can be stated that the tones of the reversal archetype provide tonal closure to the contour if they are achieved by changing the direction of the melodic line. On the contrary, the infusion of remaining diatonic (II–IV–VI–VII) and chromatic degrees, together with the consonant combination of rhythmic accents, continues the open contour:

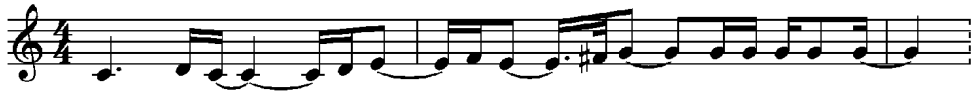

Figure 11

In the synthetic example (figure 11), the contour's registral direction changes and returns to the tones of the first-degree chord between the first sixteenth note in the first bar (D4) and the first sixteenth in the second bar (F4),[8] therefore, the melodic line moves in sections: closed (C–D–C), open-closed (D–E–F–E), open (F#–G). Additionally, for the rhythmic standpoint, the different (set on a dissonant grid) syncopations of the first bar (sixteenths and eighths at the I and III degrees, respectively) somewhat neutralize the open differentiation of the first E. However, eighths E and G of the second bar are not subjected to similar impact because they both sit consonantly on the grid of eighths. Therefore, the development of coordinated syncopated notes further emphasizes the open nature of the structural alphabet tone G. Although, openness becomes redirected towards closure by doubling the tone G and including into the contour a thus far missing syncopation on the second sixteenth (the last eight in the second measure).

One crucial observation should be discussed regarding the directions of the melodic line in figure 11. The second sixteenth of the first bar (C4) also moves in the opposite direction (C–D vs. D–C), but this does not create a new tonal section for the contour, as the assumptions for the registral reversal are different. Primarily, according to the Gestalt laws, two events have already occurred up to the second C (an upward movement C–D, considering no tone sounded before the first C). Still, only one C shifts downwards, therefore, the direction of common fate (upward) dominates, and this expectation is fulfilled with the following E–F.

Another reason for the different values of contour tonal differentiation in figure 11 is more complicated as it is related to intonation codes. The upward direction of the stream (intonation code 6, see table 2) conveys a subordinate intention to the downward dominant that has already taken place (intonation code 3), therefore, a new structure is implied: a continuation of the trajectory of the melodic line. Narmour (1989) has postulated a very similar mechanism on logical equations—A + B → C, i.e., the implication of the reversal archetype (B) is realized with a new structure C (possibly, a processual one). Meanwhile, the processual arche-

[8] More precisely, from the I degree (the highest rating in the key profile, the alphabet of the foundation) in the first bar, to the III degree, rated third for major key profile in the second bar (chord alphabet).

types manifested only because of the variation A + A → A, i.e., movement in intervals that are narrow and of similar size (below the trill threshold in difference) in a single direction does not change the melodic structure. It is easy to see Narmour's "C" being analogous while intoning to cyclicity (i.e., regularity of differentiation, "A + B" implies "C" on a second level of regularity). Therefore, the different dynamics of processes and reversal focus on equal principles of perception and operation.

In a non-tonal environment, alphabetic levels can be intoned, to a limited extent, using wide intervals, rhythmic accents, and changes of registral direction. Although, without considering the listening habit of relying on the major/minor system (which is indicated by Ambrazevičius 2017, 98), the foundation of the 1st-degree chord, the structure of the fifth, and the quality of the third are merged, forming a uniform sonorous field of pitches:

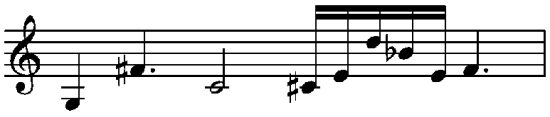

Figure 12

When only a slight differentiation of tonal profile is possible for the harmony basis (related to the register, as in the first three tones of figure 12), the regularity of the metrical grid becomes complicated as well. Thus, syncopated intonation is limited, as in these circumstances we tend to perceive different durations rather than deviations from the metric grid. In such cases, clearer intonation of the process intonation could be achieved by using greater differences in the durations between the line and accents (in figure 12, the sixteenths are eight times faster than the half note). Such differences break the stream into discrete dissonant pulses and bring back the time regularity to the line/accent intonation (codes 1 and 4 in table 2). In figure 12, such one-dimensional regularity will cause the harmonic basis to center on tones C and F#.

As can be seen by comparing figure 11 and figure 12, the consonantal intentions of the differentiated and cyclical entrainments are achieved by increasingly complementary constraints on the pulse and contour choices of the streams (codes 9, 12, 15, 18 in table 2). This kind of strategy is quite close to Lerdahl's (1998) proposed importance of tonality and meter in musical composition. Furthermore, if we assume that the consonance conditions are fulfilled, then the closed/open intonation of the contours becomes possible with the typical or extended articulation of the instruments; the latter also deviating from the standard register, as indicated by code 18. Accordingly, the combination of "high and complementary," inherited from intonation codes 6 and 12 (see table 2), shows not only the distinctiveness of the sound but also the potential matching with the specificity of the instrument (i.e., recalling the contour of the sound recognizable for the instrument in focus).

It is not hard to imagine a creator who does not have the intention of differentiating the composition's time with dissonance/consonance intentions (codes 7, 8, 10, 11 are not intoned). In this case, the combination of stream differentiation (with codes 9 and 12) for the cyclicity of stream contours becomes impossible. Thus, the undifferentiated characteristic and extended timbre articulations become statically merged. It is up to composers to use such a minimal narrative for the compositional outcome.

These strategic details conclude the presentation of the guidelines for intonation in composition. In the following subsection, all that remains is to briefly assess the influence of intonation structure on the process of musical creation.

Results and discussion

The intonation codes, outlined in the three previous subsections of this article, enable modeling of both complex or straightforward compositional elements (sounds), according to one's desire. For example, composers may choose to remain at an elementary level of regularity by intoning durations with codes 1 and 4 (see table 2), but they may as well venture into extended consonance/dissonance of tonalness, rhythmicity, and stream with the help of codes 13–18. In order to describe such differences in sound, we can employ a convenient metaphor of spatiality of the composition, which is difficult to see in the aforementioned table, but can be captured in three-dimensional diagrams. For instance, the last two rows of table 2 can be represented in the following spatial arrangement:

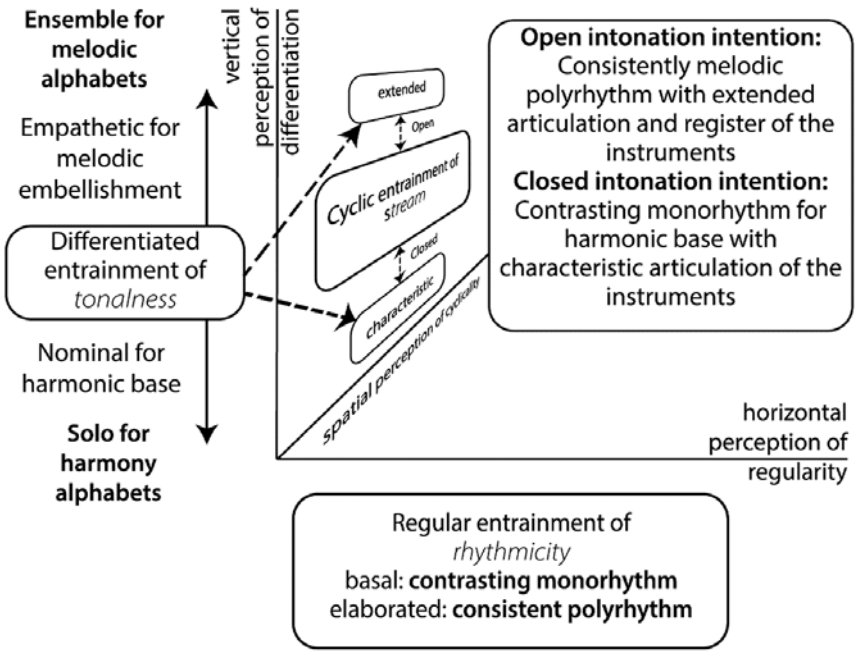

Figure 13 (S. Mickis)

Essentially, the descriptions in the arrangement of figure 3 indicate which compositional tactics intonate pitch or space components of the sound outcome. For instance, the composer may choose not to utilize the alternative contrasting and complementary polyphony methods based on classical music theory, which aim to distinguish mono-rhythms and harmonize polyrhythms. Such limits are often applied in, for example, minimalistic compositions, using drones or repetitions. In this case, the expression of melodic/harmonic intonation would also be limited; that is, the entire stream would be perceived as a monolith. In the case of the intonation methodology presented here, it can be assumed that the deliberate abandonment of the laws of intonation in composition shifts the communication of the work to the listener, to the listener's knowledge: the laws of intonation are based on the general laws of communication, on the laws of perception of sound, while a specific knowledge of the style of the musical work or of the techniques of composition requires the listener's sophistication in order to perceive the ideas of the composer, and that professional knowledge does not necessarily correspond to the composer's own understanding.

In addition, the limited regularity of the intonation can be further developed exclusively horizontally. Therefore, minimalistic repetitions, intoned with code 1 (see table 2), can only acquire the properties of static tonal sections, differentiating tonalness with reversal archetypes in a wide interval (code 2). The resulting stream would be perceived as dominant in the low register (code 3). The connotation "low" here does not refer to the spectrum but to the size symbolism references: "big is low," implying the illusion of spatial awareness. Possible acoustic communication of the proposed strategy could be described as "a solitary stream, constantly wandering in different directions near the ground." The article proposes consistent terminology considering the practice and theoretical basis of musicians' communication to avoid using descriptive wage metaphors in compositional activities.

When discussing the application possibilities of the intonation methodology, it can be pointed out that the larger the number of the intonation codes listed in table 2 are included in the composition, the stronger the spatial potency of sound can be achieved, which is traditionally referred to as "rich" musical expression. Undoubtedly, the extent of the developer's expertise and enhanced practical abilities are increasingly crucial. Furthermore, the intonation methodology allows one to choose their aim while composing, whereas the intentions of the last line (16–18)—syncopation with complementary polyphonic counterpoint, control of diatonic and chromatic melodies, use of extended timbre possibilities for contour formation—can be associated with a level of skill in composing. Nevertheless, intonations at the lower sub-system level should not be underestimated either. Although these codes are not examined in the article, additional means of achieving system-level entrainment goals could be applied using composing techniques "behind" the spatial diagrams.

It is worth noting that the codes presented in table 2 with a white background only depict the strategies of the structures. For instance, the first code only assigns durations to lines vs. accents; although the design of the codes in the sub-system hides the combined cyclicity, which does not contradict the specified system structure but allows for some associative variation:

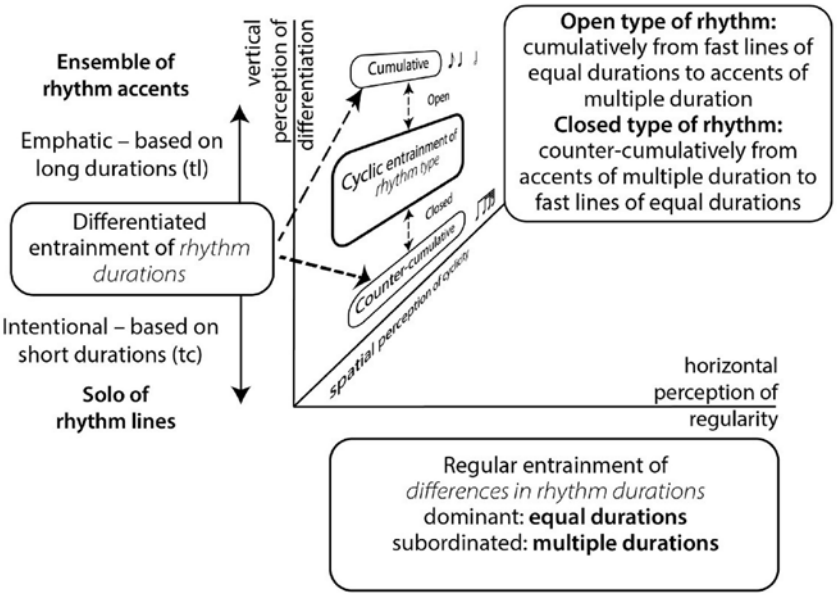

Figure 14 (S. Mickis)

As shown in figure 14, the aim of system-level intonation code 1 (using line and accents durations) begins with the articulation of multiple durations (indicated in the horizontal dimension in the figure). An elementary subordination of durations is obtained by drawing the attention of the listener with accents, when long durations cross the *tc/tl* (short/long) threshold, that is, the time intervals of accents, and approach the duration of one second. Therefore, the outcomes of elementary expression, aside from attracting attention, are only a prerequisite for the regularity of the musical time. Additionally, in the figure we can see the derived spatial dimension, which reveals the possibility of not being limited to merely two types of durations of the *tc/tl* ratio, in order to extract the openness/closure of the rhythm.

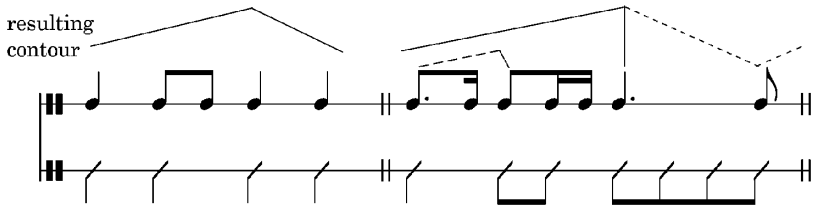

Figure 15

The contour of the second bar in figure 15 acquires spatiality due to cumulative durations. A more expressive (compared to the Arch contour in the 1st bar) *inverse gap-fill* is formed (see the contour types in figure 9), exposing intermediate durations between the structural dotted eighth and a dotted quarter. Such structure adds potency (shown with the dotted line at the end of the 2nd bar) for intonation to become the most spacious axial contour. Spatial quality is also ignited with the gap-fill micro-contour (over one tactus beat, shown with the dashed line at the beginning of the second beat), which creates a structural (end-of-contour) accent on the second beat. Due to the structure of the latter (*tc* given as a sixteenth note), the tactus (*tl*) accents become associated with the eighth notes (shown in the bottom staff of the second bar in figure 15). Therefore, the contour acquires a more energetic line, actively connecting the structural accents in beats 1 and 3, which

are identical in both bars. Although these accents are subordinated to the contour at the system level with accents of intonation code 4, the dominant (code 1) contour's content entrains empathy only in the second measure. Or, to put it another way, repeating the second measure in a pulsed manner (for a single measure becoming equal to one pulse beat) conveys the complementary intonation of the ensemble when the first measure, repeated in a pulse, reaches only nominal intonation.

The three-dimensional diagram of figure 14 shows a possible direction of further research on the topic presented in the article. Each intonation code in table 2 incorporates such extended variation at a sub-systemic level, and the latter can be equated with the intonation technique. The author has presented and classified various techniques for intonation within the compositional elements. Therefore, it is likely that future publications will expand on this subject-matter.

Conclusion

A concise list summarizes the discoveries presented in this article:

1. Spoken intonation is structured, originating from only a few different codes.
2. The purpose of speech (why it is said) is intoned by combining frequency and effort codes.
3. Musical intonation is also structured, based on conceptual models of entrainment (synchronization to the time of the music).
4. The sounding intentions of the music are intoned by combining regularity and differentiation entrainments, delivering the purpose why such a musical intonation was created.
5. In both speech and music, the means of expression affect the time and pitch of communication signals, which in music are combined in order to obtain endings/cadences and development/through-composed directions in composed *contours*.
6. The contours perceived in the short-term memory in music composition are too complex to be analyzed at one level. So, instead, their treatment is split into the super-system, system, and sub-system levels, using the TRIZ system evolution concept.
7. At the systemic level of intonation, entrainment intentions are realized in pre-perceptual sensual dimensions:
   a) The regularity of intonation, or the time of intoning, is composed using rhythm.
   b) The intonation of differentiation, or the pitch of intoning, is performed in the tonal domain.
   c) Combining the first two entrainments, a higher-level differentiated regularity, or cyclicity, is obtained, intoning contours in the stream.
8. System-level intonation corresponds to the compositional style domain of 18 intonation codes to predict sound strategies perceived by the listener.
9. Sub-system level intonation corresponds to the domain of intonation techniques, which defines intonation variations of compositional elements in creating 18 system-level entrainment codes.
10. Super-system level intonation corresponds to the musicological practice of evaluating the sound of a composition. At this level, a composer can intone based on dualistic pairs of homophony/polyphony, harmony/melody, specific/extended articulation, and principles of arrangement.

As can be seen, due to its multi-level structure, the presented methodology can contribute to learning to create music, solving questions relating to compositional concepts, and evaluating the sounding results of the compositional outcomes. Let us hope that formulating these guidelines without making complex terms, connecting the latter with the psychology of music perception and the usual communication practice of musicians, will inject applied life into the presented methodology.

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Muzikos kompozicinių elementų intonavimas

(2 dalis)

Santrauka

Tai straipsnio tęsinys (antra dalis), kuriame aptariamos kalbos intonacinių principų taikymo muzikinėje gramatikoje galimybės. Pirmoje straipsnio dalyje (Mickis 2021) buvo pristatyti intonacinių kodų ir įtraukties tipų konceptai, o šiame tekste jie modeliuojami muzikinės praktikos kategorijomis (*bazinė* / *išvystyta*, *solo* / *ansamblis*, *uždara* / *atvira*). Šiuo tikslu trys intonacinės sferos (horizontalioji, vertikalioji ir erdvinė) perkeliamos į tris komponavimo lygmenis: rezultatyvųjį spektrą, komponavimo stilių ir esminius muzikos struktūrų elementus. Siekiant charakterizuoti komponavimo stilių, yra formuluojami požymiai, kurių klasifikaciją reprezentuoja aštuoniolikos intonacinių kodų taksonomija: pradedant ritmo trukmės išraiška ir baigiant išplėstine sudėtingų kontrapunktinių faktūrų artikuliacija.

Straipsnyje pateikiamas kognityvinis kiekvienos intonacinės priemonės pagrindimas, siūloma permąstyti komponavimo praktiką remiantis intonacijos, muzikos suvokimo ir įtraukties dėsningumų tyrimais. Metodikos praktinę vertę galima apibrėžti kaip gebėjimą nagrinėti atvirą ir uždarą kompozicinių elementų (uždaras ar atviras metras, pulsas, tonalumas ar srauto spektras) intonavimą. Gilesne prasme ji suteikia alternatyvą tonaliam, dodekafoniniam, setų ar formuliniam kompozicijos metodams, įvesdama intonacijos ir gramatikos konceptus.

Pirma straipsnio dalis užbaigta teoriniu apibendrinimu, kurį vainikavo diskusija apie tai, kokių reikėtų žinių norint sukurti atitinkamą kompozicijos intonacinę aplinką. Šioje dalyje nagrinėjama, kaip taikomos teorinės žinios, kai muzikos komponavimo priemonėmis kuriamos ritmo, tonų ir srauto intonacijos.