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Title: The laws of counterpoint deduced from phenomena and confirmed on the basis of reason by Count Giordano Riccati, Preface

Original title: Le leggi del Contrappunto dedotte dai fenomeni, e confermate col raziocinio dal Conte Giordano Riccati, Prefazione

Source: Udine, Biblioteca Comunale, MS 1026/II, i-xxxix

[Page numbers are given in concordance with the ones marked by Riccati himself on each page of the treatise proper. Roman numerals have been supplied for the preface and table of content for reasons of clarity.]

The laws of counterpoint deduced from phenomena and confirmed through reason by Count Giordano Riccati from Treviso, Francesco di Toppo

[-i-] Preface

As I found extraordinary delight in music since the first years of my youth, I soon developed a desire to understand its technical workings. Immediately, it occurred to me to investigate the reason why the series that form the scale of the mode of major third is the best of all, so that, should any sound in that sequence be altered, the perfection of the sequence suffers. Although I considered closely the origin attributed by the ancients to the diatonic system, I would have gained from it no light for my research and perhaps I would be still immersed in my doubts, if Father Francescantonio Vallotti, excellent master of the chapel of the Basilica of Saint Anthony in Padua, had not made me aware of the sequence of the accompaniments that he ascribed to the notes that made up said scale. Then, I considered that these accompaniments, some of which were of the fourth and the sixth, were reduced to three fundamental ones, namely, of the major third, fifth and octave. These had as their bases the first, fourth and fifth note and produced the aforesaid accompaniments of the fourth and the sixth and of the third and the sixth. Given the experimental principle that the consonances must not [-ii-] admit in their proportions an odd number greater than five, hence they are divided into only three classes (the aequisonances, that accept the odd number one, the perfect consonances that accept the number three, and also the imperfect consonances that accept also the number five) it was easy to demonstrate that the chord of the major third contained the best harmony, and the composite of the three notes first, fourth and fifth contained within itself the best melody, as the fifth and the fourth note correspond to the first in the two perfect consonances, namely, the fifth (2:3) and the fourth (3:4). Therefore, one could deduce immediately that the most perfect scale is the one that derives from the two most excellent systems, the one of harmony, and the other of melody.

Albeit the accompaniment of the minor third, fifth and octave does not achieve the highest degree of perfection, nevertheless, it pleases the ear. Therefore, the scale of the mode with the minor third is perceived to be very elegant. It is produced and hallmarked by three fundamental accompaniments with the minor third, also based on the first, fourth and fifth note.

The aforesaid considerations made me understand clearly that music is [-iii-] a mixture of harmony and melody, since it consists in a succession of harmonious accompaniments that are heard in practice or are implied at least. Harmony is always hidden in a single-part melody that sounds pleasant, and, for instance, if I conclude the

melody in a way approved by the ear by descending from the second to the first note, this occurs because the background of the implied harmony moves from the fifth note to the first one, choosing as its conclusion the note that corresponds to the first one in the best non-aequisonant relation.

Because, when one writes in the major or in the minor mode, one does not employ only the accompaniments from which they are formed, but, since there are always two related tones, one major and the other minor that share the scale and whose basis correspond either at the major sixth upwards or at the minor third downwards, these related tones lend each other their chords, and, moreover, one employs an accompaniment composed of the minor third and the minor fifth that corresponds to the seventh note of the tone with the major third and to the second of its related tone with the minor third, the explanation of [-iv-] such phenomena required new consideration. Therefore, I understood that one must admit five secondary modes, which I call derivative, besides the two original ones. In fact, by accepting the same scale of original tones, one finds that the related first, fourth and fifth notes are accounted for, as well as the accompaniments of the third and of the fifth convenient to them. The application of these modes enables us to account not only for many passages employed in counterpoint, but also for the use of the chord of the minor third and minor fifth that is taken as consonant, although it is not so. The minor fifth is a semitone lower than the perfect one, and this semitone, which deserves the name of altered unison, enables the minor fifth to represent the perfect one sufficiently, so that it may be employed to represent a consonance. Therefore, I have named advisedly such accompaniments consonant by representation. Add to this that the ear relates our minor fifth to the ratio 7:10, which contains the odd number 7, which is endowed with the greatest elegance among the intervals that are not consonant. The derivative modes are so closely incorporated with the original ones that moving from the latter to the former is not considered to be the same as changing mode.

[-v-] The ear considers it a change of tone when one moves from an original tone to another one, and, if the new tone has a good relationship with the one that is taken as the principal one, the modulation is successful. I have not found it difficult to establish the tones that are subordinate to a principal one, since their subordinate state derives from two factors, namely, from sharing the same scale and from the closeness of the first, fourth and fifth note that constitute the melodic system. Therefore, the subordinate tones to the principal one are two similar tones founded on the fourth and fifth note and three dissimilar relative tones that, compared with the principal one and the similar subordinate tones, accept the same scale two by two. It remained to establish the relative perfection of these modulations, which depended on two elements. Composers were already aware that the the passage to the similar tone that is based on the fifth note of the principal is more pleasant than the passage to the tone founded on the fourth note. A second element, meanwhile, escaped their noticed, which teaches us that the modulation is all the more successful either when the tone to which one moves does not alter any note in the scale of the principal tone, [-vi-] or when the altered note is less important in the subordinate tone, or, in other words, namely, an imperfect consonance, rather than a perfect one or an aequisonance.

The origin ascribed by the ancient to the chromatic system must be considered to be the product of art, rather than of nature. Our chromatic system derives principally from the artificial notes introduced into the counterpoint by many melodies and harmonies belonging to that genus, which indicate its use. One may also derive their origin from the union of the scale of the principal tone and of the five subordinate ones, and from adding also the seven artificial notes of the three tones with the minor third that are indispensable for those tones to please the ear fully, as we shall see. In this way, we are presented with

an accomplished chromatic scale that divides the octave into twelve semitones, of which seven are major and are also called minor seconds, and five are minor. According to this concept, two related tones, one major and the other minor (in which if one composes, the composition revolves around the same six notes) have the diatonic and the chromatic scale equally in common.

It is not without reason that the enharmonic system, so renowned [-vii-] among the ancients fell out of use. If we attempt to revive it in a similar way that produced the chromatic, we shall realise that it is necessary to join to the principal many tones that are not subordinate to it, and we shall draw the conclusion that such irregular union banishes the enharmonic system from counterpoint deservedly.

The enharmonic diesis, which is closest to half of the chromatic, proves to be difficult to tune for two reasons, namely, because it does not constitute the difference between two consonances and because it is too small. If the chromatic diesis, although it represents the difference between consonances, is not used in harmony because of its excessive closeness to the unison, what shall be said of the enharmonic diesis? Moreover, as one employs the minor second in harmony and melody, and the minor semitone or chromatic diesis only in melody, one discovers easily that the enharmonic diesis needs to be excluded from both of the above.

Once I established the diatonic and chromatic systems, I turned to consider the bar, which renders the simple proportions pleasant to the ear by means of the duration of sounds. As to the length of the sounds, this is very limited, since the sensory perception [-viii-] does not allow that the two parts of the bar (an initial main one called strong beat and a concluding one called weak beat) are represented by any other ratios than the two very simple ones 1:1, 2:1, which define two sorts of bars, the one in duple time and the one in triple time. I was very keen to define the practical realisation of said beats, and I was able to observe that the strong beat, as it is the main one, must be self-sustaining, while the weak beat, as it is secondary, must lean against the strong beat that begins the following bar. The same rule applies also in the case of the divisions and subdivisions of said beats, that must be considered to be duple or triple time bars. The comparison between the weak beat with the adjacent strong one onto which it leans is very clear; sufficiently clear is the comparison between two adjacent strong beats, as the first and the second one of a triple-time bar are, and, finally, the comparison between a strong beat and an immediately ensuing weak beat is obscure. The different degree of clarity in these comparisons must be considered in preparing the dissonances and in moving from an accompaniment to another one. An elegant passage shall prove more pleasant if the first chord falls on a weak beat and the second one on a [-ix-] strong one, precisely because these beats contrast strongly with each other. Conversely, a less commonly used passage shall prove more easy to employ when the preceding accompaniment falls on a strong beat and the following one on a weak one, because their comparison is less clear.

After the aforesaid investigations, I turned to consider the movements from one chord to another one in order to decide which have to be observed to produce perfect sequences of the chords and of the fundamental movement of the melody and of what derives from it. I considered the good or bad relation that derives from the memory of the sounds of the preceding accompaniment compared with the sounds of the following one, the consonances by representation either softened by being prepared or introduced deliberately or rendered more severe by an inverted preparation (we shall see at the appropriate time what are direct and inverted preparation) and, finally, I considered the aim, achieved or not, for which the artificial notes have been allowed in counterpoint.

Good method would have required that I should start from the passages consisting of two accompaniments containing only five natural notes, and that those that

move from one to the other of the three accompaniments, from which the major and minor mode are derived, should come before all the others. [-x-] The passages that we describe ascend to the number of six in each mode, and among the said six four (from the first note to the fifth, or from note the fifth to the first, from the first or from the fourth to the fifth) deserve the title of cadences, that are the movements endowed, the first with the greatest elegance, and the other with a high degree of it, and that are more or less suited to conclude meaningfully the composition. In order that the cadences of the minor mode may satisfy the ear, it is necessary to resort to the craft, and here is the law that I discovered. It is not sufficient that they should be similar to the ones of the major mode in their fundamental passages, but it is necessary to render them more similar by employing artificial notes in certain movements of the upper parts that make a greater impression on the ear, such as in the passages of a major semitone, on condition that the natural semitone does not destroy the natural one. It is necessary, to apply this law, that one should augment artificially the seventh natural chord with a sharp in the three cadences from the fifth note to the first one and from the first or from the fourth note to the fifth, so that the one that occurs in the major mode differs from the octave by a minor second. [-xi-] Thus, once we introduce the seventh artificial note, we must employ in many cases the sixth artificial note as well, in order to avoid the chromatic melody of the augmented second, which would be created by the sixth natural note and the artificial seventh. One may proceed from the fourth note in two ways, a more perfect one that leads towards the first note, and another less perfect one that leads towards the fifth, because, while the ear expects the first sort of movement, it is not very satisfied with the second one. The cadence from the fourth to the fifth will produce a less pronounced feeling of suspension if the fourth note is raised by a minor semitone. Since the passage from the fourth artificial note to the first one is faulty, the cadence from the fourth artificial note to the fifth becomes necessary and more conclusive. We shall observe that the fourth artificial note of the minor mode opens the door to a new chromatic accompaniment of the diminished third and of the minor fifth and to its derivative that can be employed only in the aforesaid cadence, on the basis of which they have been accepted in counterpoint.

There follows the illustration of the natural passages specific of the derivative modes, which are of fifth, of a fourth and of a second upwards and downwards. Since both in the original and in the derivative modes the passages of the ascending second [-xii-] move gaining in perfection from the fourth and less perfect note to the more perfect fifth, and those of the descending second move from the fifth note to the less perfect fourth to the detriment of their perfection, it is clear that the first sort of movements are better than the second type. The derivative modes, each of which has its four cadences, lend two of them to the major mode and two to the minor mode, so that they move to them from the second to the fifth note and from the seventh to the eighth note. Although practical musicians employ them frequently, music theorists do not mention them. We must not be surprised at this, because they ignore the derivative modes, on which bases one can account for them. The cadences from the second to the fifth notes, that turn into cadences from the fifth note to the first one in the derivative modes, shall be assimilated to the corresponding cadence in the major mode according to the rule provided by me in the passage of the minor second, and they shall produce in both instances the relative fourth artificial note, and, in the case of the one in the minor mode, the seventh artificial note instead. The preceding accompaniment of this latter cadence is changed from the fourth artificial note to a major third and a minor fifth, a kind of chromatic modification to be employed [-xiii-] only in said cadence. One cannot find it explained in theory treatises, but I have found examples of it in the compositions of Signor Benedetto Marcello, Father Master Vallotti and of Signor Giuseppe Tartini. Sometimes the preceding

accompaniment from the second to the fifth note of the minor mode is turned into a real consonant accompaniment by means of the second note which is lowered by a semitone from the natural one. In order to avoid the passage of a major fourth from the artificial second note to the fifth, one employs the accompaniment of third and sixth both minor, which relates to the fourth note of the mode, instead of the fundamental. Hence, one moves to the fifth furnished with the consonant artificial chord by a major third. I have found music master, however well versed in music theory, who can explain the reason why the second artificial note of the minor mode is used. After considering the matter on several occasions, I understood finally that, since said note is used only in the cadence from the second to the fifth note under the condition that the following chord is also transformed into a major third through the seventh artificial note, the only aim for introducing it [-xiv-] into counterpoint is to assimilate harmonically our cadence to the corresponding one of the major mode that moves from the fifth note to the first one. In order for the cadence from the seventh to the eighth note of the minor mode may be assimilated in the movements of the major semitone to the one of the major mode according to the prescribed law, it is necessary to substitute in the first accompaniment the seventh artificial note to the natural one, so that it may correspond to it the chord of minor third and minor fifth, as in the major mode.

Continuing my journey, I became involved in considering the passages that act as transitions from a mode to another one that have their scale in common and all move by third, either upwards or downwards. Since the ear expects that one supplies the higher third with the derivative accompaniment of the third and of the sixth, rather than the fundamental one of the third and of the sixth, the passages ascending by third are less pleasing to the ear. than those descending by third. The accompaniment of major third and augmented fifth, which can benefit the third note of the minor mode, derives mainly from the passage of the downward third from the fifth to the third note, when one ascribes to the fifth note the accompaniment [-xv-] of the major third and of the fifth and one wants that the compositions rests in the same tone with the minor third.

Now, I shall highlight my thinking on the passages that necessarily move from a principal tone to a subordinate one or vice versa, since they consist of two accompaniments none of which is common to the two tones. They must be employed with great care, since the ones that I describe can be understood to contain some details that are not entirely favourable. These entail, as far as melody is concerned, the passages of the major fourth or minor fifth, both upwards and downwards, and the passages of the descending second and ascending third, while, as far as harmony is concerned, the passages composed of two accompaniments of minor third and minor fifth. I show that the passages composed of two chords, the first of a minor third and a minor fifth, and the second truly consonant, either built on the same base or on a base that is a semitone lower than the one of the first chord, must be placed in the same category.

The passages containing artificial chords have provided me with ample subject matter. They require [-xvi-] to be employed with greater circumspection compared to what becomes necessary in the natural passages, since the aim for which the artificial notes have been introduced into music has to be fulfilled. This needs to be achieved with all the more rigour as the artificial notes (fourth of both modes and second for the mode with the minor third) are less necessary and as the artificial sounds are placed in accompaniments of a more prominently audible nature.

To complete our review of the harmonic accompaniments, it remains for us to consider the dissonances, which are a tasty condiment of musical compositions, when they are employed correctly. I shall relay the analysis of the thinking that guided me to true theory. Music masters commonly presume that dissonance is a continuation of the

prepared sound which takes the place of the consonance onto which it has to resolve. In the first place, this idea does not account for the seventh, which certainly does not substitute the sixth one which it resolves, since, as a consonance, it cannot be placed in the chord of the third and of the fifth. Therefore, one clearly discovers that the seventh is a new sound added onto the fundamental consonant accompaniment [-xvii-] of the fifth and of the third. I move on to the ninth, eleventh and thirteenth. If each of these excluded the consonance onto which it resolves and the sound aequisonant to it, it would follow that, since the ninth resolves onto the octave, which is aequisonant to the base of the chord, one could not employ the fundamental harmony of the third, fourth and ninth, which is a consequence entirely opposed to practice. Therefore, the ninth as well is a new sound joining the chord of the third and of the fifth. Neither the twelfth or the fifth can be added to the thirteenth, and it will occur that if one builds a thirteenth with the base and the added third, the ear has no grounds to recognise it as a dissonance. Of the three sounds of the consonant accompaniment, only the fifth highlights the thirteenth as a dissonance. Therefore, the fifth must be implied at least, so that the thirteenth itself may be a sound coupled to the consonant harmony of the third and of the fifth. Moreover, if the idea of the sounds joined in the consonant chord is compatible with the three dissonances of seventh, ninth and thirteenth, the same must be stated about the eleventh, especially since the most esteemed composed of the fifteenth century couple it sometimes with the third, which I have also found [-xviii-] several times in the famous duets of Monsignor Agostino Steffani, although it is sufficient for the third is implied, when it is not heard in practice.

After I have provided this true description of the musical dissonances, to which one must add that, since they are subordinate to the consonances, they must be chosen from the natural scale of the mode in which the composition is written, I move on to examine another system of dissonances supported by very excellent writers of counterpoint. They found the dissonances in the geometric ratio, stating that a chord is dissonant in as much as it contains similar intervals that relate to sounds that are not aequisonant. Thus, the accompaniments of the minor ninth and seventh, because the former contains two minor fifths and the latter two minor thirds. The system mentioned is false for three reasons, namely, because it is not general, because it makes appear dissonant a chord that is not such, and because it is not capable to do justice to the character more or less mild of the dissonance. Starting from the first one, the chords of the minor ninth and of the major eleventh, in which there is no couple of such similar proportions corresponding to sounds that are not aequisonant, are certainly dissonant. Secondly, [-xix-] since the sounds are represented by the 6 ratios produced by more sounding bodies in the same time, the series 1, 2, 3, 4, 5, 6 produces the consonant accompaniment by major third ordered in the opposite way, which, according to the aforesaid principle, should be regarded as dissonant, since they comprise the two similar proportions 1:2, e 3:6, whose first terms 1 and 3 are not aequisonant with each other. However, if in their place they will try to thwart the objections by stating that it is a prerogative of the aequisonances that they produce dissonances when they are doubled, they will have to concede to me that, if this is true, the dissonance shall be milder the simpler is the doubled consonance. Therefore, one shall deduce from this as a necessary consequence that the ninth is the best of all the dissonances and the minor seventh the worst. In order to avoid this mistake, they are forced to abandon their system to the seventh and to the ninth and to state that the seventh is much less harsh than any other dissonance and that it is the only privileged one because it is compared to the number seven and it is expressed by the ratio 4:7. But I was waiting for them to make this move. In the progression 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, the fifth and the major third [-xx-] are introduced by the division of the octave 2:4 and of

the fifth 4:6. Also, although the dissonances must be taken from the natural scale of the mode, the minor seventh, by admission of the most lauded masters, derives from the diatonic division of the fourth 6:8, that produces a sound sufficiently close to the 7. Since they started on this path, why do they not continue in such a way as to produce the ninth, the eleventh and the thirteenth from the diatonic divisions of the intervals that are gradually less simple, namely, 8:10, 10:12, 12:14, and why do they not explain the decreasing degree of their elegance in agreement with experience? I admit the geometric proportion in the matter of the dissonance not as a principle, but as a circumstance that renders them milder. For instance, between the two ninths, major and minor, the former is preferable not only because its fundamental ratio is simpler, but also because it contains two fifths, one belonging to the consonant accompaniment and the other one loaded between the fifth and the ninth, which is minor in the minor ninth and increases the piquancy of the chord.

After I have established firmly [-xxi-] the correct idea of the dissonances, I set myself to lay out with the way to apply them correctly. The seventh, especially the major one, likes to be prepared, and this is a requirement without exception for the ninth, the eleventh and the thirteenth. This preparation is achieved in such a way that a consonant sound, even an altered one, produces a dissonance in the following accompaniment. Thus, the dissonant sound is a continuation of the preparing sound and the dissonance is introduced with the most simple melody from the unison. The ordinary dissonances are prepared on the weak beat and they are introduced on the following strong beat, or they are prepared and introduced in two adjacent strong beats because the openly different execution of said beats renders their comparison very clear, or at least sufficiently clear. Only the seventh can be prepared on a strong beat and can be introduced on the following weak beat, which is barely distinguishable from the former on

Once the ear has tasted the sharp flavour of the dissonance, it desires that it should cease and that the resolution should follow. If the dissonant sound continues and it is turned into a consonance or a special dissonance, one would employ a reversed preparation which would sound bitter to the ear. [-xxii-] Therefore, it is necessary to move from a dissonant sound to another one that is a consonance or a special dissonance, and I was able to prove easily that, of the ensuing movements of the high parts, those that move by step are the best ones, and that the descending movements deserve to be preferred so that the dissonances are resolved by descending with a stepwise motion.

Then, I discovered two canons that determine all the passages with which the dissonances can be prepared and resolved. After that, I set out to discuss the prerogatives of the seventh, especially the minor and diminished one and I showed that the minor seventh, which corresponds to the fifth of both modes, major and minor, is more privileged than all the others.

After I prepared all the materials to build the harmonic edifice, it was necessary to teach how to lay them out. I started from discussing the various dispositions that the consonant and dissonant chords can have in four, eight, three and two parts, and I demonstrated in the end that the best disposition must not and cannot always be assigned to them, because the excessive uniformity would affect the ear very soon and because, if the preceding chord is laid out in the best way possible, the simple motion of the parts requires it [-xxiii-] to be changed in the following. Subsequently, I showed which sounds it is best to double and which ones must not be doubled and I noted that often it is advisable that a part should touch several sounds of the same accompaniment in succession, warning the reader that it is best to avoid the passages of altered consonance in the chords that are employed as consonant, because they are not such.

There follow the rules to move from a preceding to a subsequent chord, in which

case, even if they are consonant, we are led by a fundamental passage and eight derivative ones. The highest degree of perfection, aside from the relation to the fundamental passage, depends on two elements which are the quality of the derivative passage of the melody and the quality of the chords corresponding to the two sounds that constitute it. As to the first element, the passage is most perfect when the sounds that constitute are in unison. The second degree of perfection is due to the movements that ascend and descend by step, the third one to those that move by leap from one to the other. Respectively, as to the second element, the consonant fundamental accompaniment satisfies the ear to the highest degree, then the derivative accompaniment of the third and of the sixth and then the other derivative accompaniment of the sixth and of the fourth, which deserves [-xxiv-] the lowest place because the ear realises too clearly that, since the fourth is the inversion of the fifth, the true bass is missing. Therefore, we shall have five classes of derivative passages that are gradually less pleasant, according to whether the following couples of accompaniments correspond to the two sounds that constitute them: third and fourth, third and sixth, and vice versa; third and sixth, third and sixth; third and fifth, fourth and sixth, and vice versa; third and sixth, fourth and sixth and vice versa; fourth and sixth, fourth and sixth.

The consideration and esteem that the passages derived from a given fundamental deserve depends on the joined consideration of the aforesaid elements. In the *bassi continui*, which contain the best passages, one shall strive hard to ensure (except sometimes in fugues) that one should leap from a chord of third and sixth to another one of fourth and sixth or vice versa, or both by leap and by stepwise motion from a chord to another one both of fourth and sixth. It is very laudable that the parts should move from a consonance to another one of different sort, in order to avoid the succession of two unisons, two octaves and two fifths that are forbidden one after the other. In fact, notwithstanding their perfection, the parts do not sound as two but as a single one. Two fourths are allowed, [-xxv-] but sparingly, and only on condition that they belong to an inner part.

Musical compositions must be furnished with unity of subject, which consists in the uniformity of some short melodies easy to remember. Unity originates from transposing the melody in different keys and from placing it in corresponding parts of the composition, while variety comes from an appropriate mutation of the different melodies.

In counterpoint, just as in poetry, several degrees of unity are admitted. The most perfect unity is found in the fugues and in the subjects. In such compositions the leader or antecedent part proposes a melody belonging to a given tone that is built in such a way that the answer of the consequent part, which begins to sing after a certain amount of time, resembles the proposed part as much as possible without abandoning the scale of the tone. Each tone contains two similar hexachords that are usually called natural and by square [sqb], both of which are expressed by the syllables Ut, RE, Mi, Fa, Sol, La. The uniformity of the subject and of the answer depends entirely on the degree of resemblance of the mentioned hexachord, by virtue of which [-xxvi-] the passages that occur in the antecedent part in the first or in the second hexachord are imitated by the consequent in the second or first hexachord. Meanwhile, it occurs frequently that the subject moves from one hexachord to another one, and in these cases the answer must transfer to the hexachord left behind by the subject. In this way one reaches the double aim to adhere to the scale of the tone and to be able to imitate in the new hexachord the motions of the subject. If one compares to this rule the subject composed by the most excellent masters, one shall find that they abide by it in a wonderful way. Father Vallotti, whom I praised above, composes other two melodies that form four parts in conjunction with the subject and the answer, and, by alternating these melodies and by transposing them to the similar

tones that are subordinate of the principal one, weaves his masterly subjects that are furnished with rigorous unity.

After this topic, I set out to discuss double fugues, imitation, canon, double counterpoint, and compositions based on repeated ideas, and the method for composing *versetti* and arias, and I discovered the clear truth that, in any sort of musical composition it is necessary that the units that constitute it have such a relationship both [-xxvi-] to it as a whole and with each other that one can say with reason that the whole composition is endowed with unity and that its units can be described as parts of the same whole.

Then, I set out to consider the variation of the musical temperaments. I realised very soon that this mattered needed to be clarified. If in the major and minor modes one employed only the accompaniments from which they derive and their derivative ones, the temperament would be redundant. This becomes necessary when one employs in the major mode the accompaniments of the minor relative mode, or vice versa, because the second sound of the mode with the major third and the fourth of the relative mode with the minor third differ by a comma. These are the principles that guided me to the true theory of the temperaments.

The simplicity of the aequisonances and of the perfect and imperfect consonances are represented by the inverse disposition of the odd numbers 1, 3, 5. Since all the aequisonances are equally simple, they should be altered all in the same way, but this cannot be achieved unless they are left untouched. Hence, they must remain so. The perfect and imperfect consonances have to be modified according to the ratio of the numbers 3 and 5, in other words according to the reciprocal ratio of their [-xxviii-] simplicity. Three suppositions are made, removed a comma from the unit, namely, that three fifths and a minor third, or three major thirds and four minor ones constitute two octaves, and that three octaves consists of four fifths and a minor sixth. If the comma is divided according to the prescribed law among the consonances of different species that constitute two and three octaves, three different temperaments are created. The first instance leads to the best temperament, which is half-way between the ones suggested by the other two.

The general temperate system for the instruments ordinarily employed are useless, because the only one with twelve medium semitones, which would be suitable, is impractical because of its tuning is too harsh.

Therefore, practical musicians correct it by shaping the difference of the fifth and of the minor sixth in relation to the white keys according to the third mentioned temperament, and assigning the temperament of the system of twelve semitones to the fifths that are strictly such, in which there are one or two black keys. This unequal temperament is necessary so that the interval [-xxix-] G# Eb (that, if one changes the name of the higher or lower key, can be employed as the fifth G# D# or Ab Eb) does not offend the ear in an intolerable fashion. I have chosen them, because, since the difference between the fifth G# D# and of the major sixth A G# are in proportion with each other, the improvement of one would result in the detriment of the other.

With regard to the most perfect temperament of the black keys, the true sharps are sharper and the true flats are lower by a difference that, however small, it is noticed by the purity of our ear. The quantity by which the sharps and the flats that are improperly so, namely, when the keys are used in a form that is not their own, are much greater.

One may with great reason ascribe to music the power to imitate the meaning of the words and to awaken several emotions in the soul. Nevertheless (who would believe it?) a subject of such great importance was left almost untouched and required to be discussed from beginning to end, starting from its principles, which, once they are uncovered, shed very ample light on the matter.

One can express the internal motions of the soul through the medium of music and by using a principal mode, by imitating through the musical sounds the [-xxx-] modifications that specific emotions produce in the natural voice. The tranquil state of man is half-way between powerful emotions (that are accompanied by an extraordinary agitation of the animal instincts) and weak emotions, that render the motion of the mentioned impulses more languid and less active than it is normally the case. The observation of the fact that strong emotions make one speak more loudly, faster and with higher pitch of the voice, while the weak ones make one speak more slowly and with a lower tone of voice illustrate clearly how one can use loudness, softness, fast and slow pace, high and low pitch in imitating the emotions.

Since low voices are characteristic of the masculine, majestic and strong sex, while high voices are typical of the feminine, graceful and soft, the ear shall experience low sounds endowed with majesty and strength and high sounds furnished with grace and softness. Moreover, because a man is more capable than a woman in arising terror in the soul of the listener, composer inspire the feeling of fear by employing low and masculine voices rather than high-pitched and feminine ones. Fear is connected closely with darkness, the shadow of the dead and with depth, topics that are represented vividly with the aid of low sounds. Conversely, high-pitched voices [-xxxi-] are useful to express sublime objects.

Moreover, we shall see that different sorts of bars, strong and weak beats, ties and rests contribute to imitation, and then we shall discuss some melodic expression that are a consequence of what we have already explained and do not require new principles, namely, by describing the way to express ascent and descent, rising and lowering, going forwards and backwards, turning, hiding or highlighting distance.

Simplicity and other similar characteristics are represented by the most simple harmonies and melodies, while, conversely, masters must employ refined and artificial melodies and harmonies to put across the idea of intelligence, artifice and deceit.

After showing that cadences complete the sense of the words and also signify completion, decision etcetera, I shall explain how the meaning can be kept hanging and how one may express anything that does not satisfy the soul. Then, I shall move on to explain how one might resolve pleasant and unpleasant feelings or middling emotions. I shall not fail to add the reflection that strong passions cause great changes in the voice, as to its high or low pitch, while weak passion cause very small changes. This is a detail that opens the way in [-xxxii-] Music to many very beautiful imitations.

However, the spring that produces all of the most masterly imitations is the matter mentioned above, namely that strong feelings raise the ordinary tone of our voice, while weak feelings lower it. Therefore, the mere passage from the low to the high register or from the high to the low one is useful in producing a certain strength or weakness of feeling. The asking of a question, which is classed as a rhetorical device, contains in itself a certain degree of energy, and for this reason is expressed by a melodic passage that moves from the low to the high register.

Just as strong and weak feelings alter the usual tone of our voice, music revels ver much in employing altered voices in order to imitate them. If the alteration implies a rising of the voice, it is used to describe strong emotions, while, if it implies a lowering of it, it is used to describe weak emotions. Alterations are divided into two categories, the first one of which contains notes modified by a minor semitone that fall within the remit of counterpoint, and the second one the alterations that depend from the unequal tuning of the keyboard instruments commonly used.

The scale with the major third [-xxxiii-] represent the tranquil state of man and the intervals that underpin the mode itself must be considered as exact. If one compares the

scale of the mode with the minor third and of the five derivative ones with the one of the mode with the major third, when a note is lowered, it excites weak emotions, while, if it rises, it excites strong emotions. The artificial notes also contribute to the imitation of the emotions, according to whether they fall or rise in relation to their respective natural notes. It also contributes to the arousal of weak or strong emotions the immediate use, when one moves from a tone to another one, of the natural and artificial notes that the new tone modifies by means of the flat or sharp sign.

It remains for us to note what part the alterations of certain sounds that originate from the unequal tuning of the keyboard instruments commonly used play in the expression of weak or strong emotions. These alterations can be divided into two categories, of diminution, when they contribute to the expression of weak emotions, and of augmentation, when they express strong emotions. The notes accompanied with by flat signs are lower and those accompanied by the sharp signs are higher than they would be if they shared the temperament that corresponds to the white keys. The character of the tones with the major or minor thirds that are used in the instruments that we employ commonly derives from the aforesaid [-xxxiv-] small, but audible, alterations that occur in the true flats and sharps, and from the much larger ones that occur in the flattened and sharpened notes that called so improperly, namely, when a name that does not belong to a particular key is assigned to it.

Since I consider that music is a branch of physics that should not be despised, I followed in the steps of the incomparable Galileo Galieï and I have applied to it the method that is employed in physics, keeping myself to experiments and extracting the appropriate deductions from analysing and comparing the results, so that they may lead us to establish the laws of counterpoint and to account for what good Masters have been able to clarify by repeated attempts. I am certain that I strived to include everything of importance, but I leave it to the discerning readers who possess a grounded knowledge of both practice and theory of music to judge the extent in which I have been successful. I conclude by informing you that my considerations mentioned above are laid out in four books and that they follow the order in which I have described them, [-xxxv-] as one can gather from the Index of the books and of the chapters.

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