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# Dissonance and harmonic progression

## The impact of the *seconda pratica* on the advent of tonality

### Introduction

This paper seeks to provide elements of explanation for one of the most outstanding characteristics of tonal harmonic language: the directional tendency of chord sequences highlighted by Nicolas Meeùs' theory of harmonic vectors<sup>1</sup>. The phenomenon, described as the asymmetry of root progressions, has played a decisive role in Western music. It was present in a latent state from at least the 14<sup>th</sup> century and appears fully in the 17<sup>th</sup> century, where it determines the organization of tonal syntax. One of the parameters that affects chord progressions is discussed by the theorists of harmony of the 18<sup>th</sup> century: the rules for the preparation and resolution of dissonance; rules on which Rameau bases partly his theory of fundamental bass<sup>2</sup>. Carl Dahlhaus, examining the historical significance of the *Traité de l'harmonie*, established that Rameau's theory of chord progressions takes for philosophical premise the Aristotelian principle of the tendency of imperfection towards perfection<sup>3</sup>. At the present stage of research<sup>4</sup>, the asymmetry of root progressions seems to rise from this philosophical principle which underlies the contrapuntal rules for consonant and dissonant interval progressions. The treatment of the dissonance is subjected to a major evolution with the advent of the *seconda pratica* at the beginning of the 17<sup>th</sup> century. This article will attempt to demonstrate that the evolution of the treatment of the dissonance, in conjunction with the change of the aesthetic paradigm from *prima* to *seconda pratica*, is to be considered one of the main causes of asymmetrical progressions and may have contributed to the birth of tonality. My reasoning will be based partly on Christoph Bernhard's theory of figures<sup>5</sup>. Two madrigals by Monteverdi, respectively from the *prima* and *seconda pratica*, will be used in order to test my hypothesis: the madrigal *Cantai un tempo* from the 2<sup>nd</sup> book and the first part of the *Lamento d'Arianna* from the 6<sup>th</sup> book of madrigals<sup>6</sup>.

### Underlying philosophical principles, contrapuntal rules and chord progressions

From Tinctoris onwards, Renaissance theory establishes a distinction between two basic types of dissonance: passing notes and suspensions. The latter category of dissonance plays a major role in the asymmetry of root progressions. The rules which define its use arise from two philosophical principles which crystallize in Western music: 1. a static principle founded on balance and gravitation around a center, 2. a dynamic Aristote-

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<sup>1</sup> Meeùs, Nicolas. 2003. Vecteurs harmoniques. *Musurgia* X: pp. 7-34.

<sup>2</sup> Rameau, Jean-Philippe. 1722. *Traité de l'harmonie réduite à ses principes naturels*. Paris: Ballard.

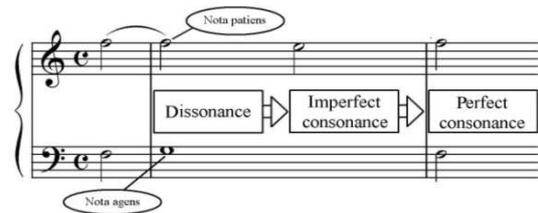
<sup>3</sup> Dahlhaus, Carl. 1990, 2001. Die maskierte Kadenz: zur Geschichte der Diskant-Tenor-Clausel, In *Erste Gesamtausgabe aller Schriften von Carl Dahlhaus*, ed. Hermann Danuser, vol. 3: pp. 547-557. Laaber: Laaber.

<sup>4</sup> Guillotel-Nothmann, Christophe. 2007. *Dissonances et progressions harmoniques, Le cas du Tractatus augmentatus compositionis (c. 1655-1659) de Christoph Bernhard*. Paris-Sorbonne - Patrimoines et langages musicaux. <http://www.plm.paris-sorbonne.fr/publications2Guillotet.shtml> (accessed November 20, 2008).

<sup>5</sup> Bernhard, Christoph. 1999. *Die Kompositionslehre Heinrich Schützens in der Fassung seines Schülers Christoph Bernhard*, ed. Joseph Müller-Blattau. Kassel: Bärenreiter-Verlag Karl Vötterle.

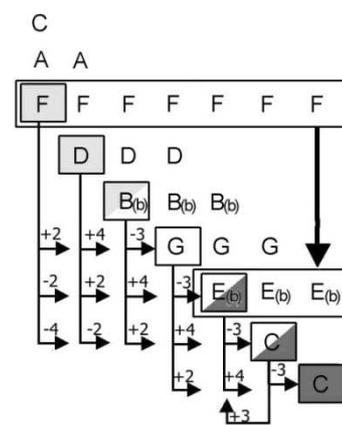
<sup>6</sup> Monteverdi, Claudio. 1926-68. *Tutte le opere di Claudio Monteverdi* [...], ed. Francesco Malipiero. Wien: Universal Edition, vol. II and vol. VI.

lian principle of the tendency of imperfection towards perfection<sup>7</sup>. The origin of the rule according to which the dissonance, associated with imperfection, must be resolved by the least movement onto an imperfect consonance and then onto a perfect consonance associated with perfection is related to this Aristotelian principle<sup>8</sup>. It will lead to the rules of preparation and resolution that are characterized, following Artusi's terminology, by the interaction of the *nota patiens* and the *nota agens*<sup>9</sup>.



**Figure 1** Interval progressions and teleological principle.

Figure 2 shows the correlation between voice-leading and chord progressions in a context of more than two voices. The *nota patiens*, here F, has to be prepared, i.e. has to be consonant in the harmony that precedes the dissonance. It can either be the fundamental bass of a triad on F, the third of a triad on D or the fifth of a triad on B. These three hypothetical fundamental basses are framed and appear on a light grey background in figure 2. At the moment of the impact of the *nota agens*, the *nota patiens* is dissonant by definition and can imply a diminished fifth, a seventh, a second or a fourth. This leads to the following consequences: the *nota agens*, having to be consonant with the other notes of the harmony can be, depending on the type of dissonance employed, the lowest note, the third or the fifth of a triad on B, G, E or C (these fundamental bass notes appear on the white background). Lastly, after the impact of the dissonance, the *nota patiens* has to resolve subsequently by downward stepwise movement, which is indicated by the bold arrow connecting F with E(b)<sup>10</sup>. The resolution E(b), being necessarily consonant, can either be the lowest note of a triad on E(b), the third of a triad on C or the fifth of a triad on A(b). These fundamental basses appear on the dark grey background.

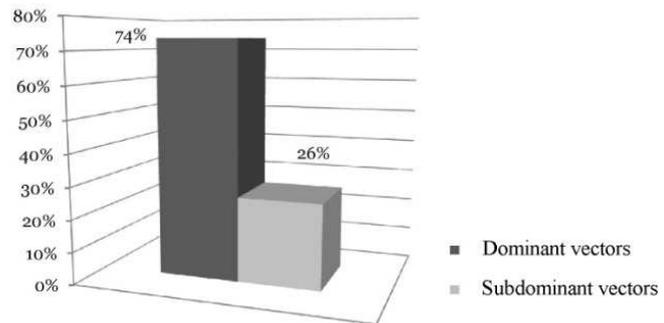


**Figure 2** Voice leading and harmonic progressions.

Several deductions can be made: the preparation and resolution of the dissonance both generate a directional tendency of root progressions. This gives rise to a fall of one, two or three units in the cycle of thirds between the dissonance's preparation (in light grey), its impact (in white) and its resolution (in dark grey). This fall corresponds to the dominant vectors that are favored over sub-dominant vectors, as the following histogram shows (figure 3). It summarizes the percentage of the vectors that are implied by treatment of the dissonance (74% VD - 26% VS). Insofar as the directional tendency of chord sequences is conditioned by the use of dissonance, the asymmetry of root progressions, identified by the theory of harmonic vectors, reflects the Aristotelian principle that is characteristic of harmonic tonality. From the 15<sup>th</sup> century onward, this teleological principle will

<sup>7</sup> Dahlhaus, Carl. 1990, 2001. Die maskierte Kadenz: zur Geschichte der Diskant-Tenor-Clausel, *op. cit.*, p.550.  
<sup>8</sup> *Ibidem* and Cohen, David E.. 2001. The imperfect seeks its perfection: Harmonic progression, directed motion, and Aristotelian Physics. *Music Theory Spectrum*, vol. 2: pp. 139-169.  
<sup>9</sup> Artusi, Giovanni Maria. 1589. *Seconda parte dell'arte del contraponto: Nella quale si tratta dell'utile et uso delle dissonanze*. Venetia: G. Vincenti, book 2, chapter 1, p. 27 sq..  
<sup>10</sup> Three fundamental basses, B(b), E(b) and C have two different functions: the triad Bb-D-F can occur during the preparation of the dissonance (light grey background) whereas the dissonant triad B-D-F can be associated with the impact of the *nota agens* (white zone). Similar considerations lead to the white and dark grey colors associated with the fundamental basses E(b) and C accompanying either the impact or the resolution of the dissonance.

crystallize in the cadence, which suggests that the asymmetry of root progressions was propagated, in the first time, from cadences. This hypothesis would support significantly Edward Lowinsky's argument, according to which, the cadence must be considered as "the cradle of tonality"<sup>11</sup>. Furthermore, the decisive rules for asymmetry of root progressions belong to counterpoint. This implies two consequences: 1. a strong bond between voice leading and the progression of the fundamental bass<sup>12</sup> and 2. a close link between counterpoint rules and harmonic tonality. These correlations enforce the conclusion that tonal syntax arises partly from contrapuntal rules.



**Figure 3: Root progressions theoretically implied by preparation and resolution of the dissonance.**

## Change of aesthetic paradigms and asymmetry of root progressions

The rules of preparation and resolution were formalized at least as early as the 15<sup>th</sup> century, and so cannot be directly connected with the birth of tonality. I suggest that it is the evolution of the role and function of the dissonance in *stile antico* and *stile moderno* which is determinant for the increased asymmetry of root progressions. This evolution is reflected in Christoph Bernhard's theory of figures. According to Bernhard, in *stile antico* the dissonances serve to facilitate the passage from one consonance to another and to decorate the counterpoint. They are presented only in the form of the two *figures fundamentales* (*syncopatio* corresponding to suspension and *transitus* corresponding to the passing note)<sup>13</sup>. As a result, dissonances, which are rarely used, play only a minor role. In *stile moderno*, the dissonances assume the same functions as in *stile antico* and are also employed in order to express the passions of the text, according to the aesthetic ideal of "*Oratio Harmoniae Domina absolutissima*"<sup>14</sup>. They are not only represented by *figures* belonging to *stile antico* but also by the *figures superficiales* which codify the irregular and varied use of the dissonance<sup>15</sup>. As a result, dissonances, which are used frequently, assume a major expressive and descriptive function in *stilo moderno*. Bernhard's theory of figures makes it possible to establish a direct link between the aesthetics of *seconda pratica* and the stressing of the asymmetry of root progressions. There are three points to consider. The first of these is the expressive and descriptive use of dissonance. This leads to (2) the freer use of dissonance and (3) the more frequent use of dissonance.

### *Expressive and descriptive use of dissonance*

The correlation between the expressive use of dissonance and the asymmetry of root progressions can be established on two levels: 1. the text's semantics and 2. its syntax. Both of these have repercussions, through the expressive use of dissonances, on harmonic syntax (figure 4). The correlation between the text's semantics and harmonic syntax stems from the desire for a musical transposition of those passions which are expressed by

<sup>11</sup> Lowinsky, Edward Elias. 1962. *Tonality and atonality in sixteenth-century music*, Berkeley: University of California Press, p. 4.

<sup>12</sup> Meeüs, Nicolas. 2005. *Vecteurs harmoniques et théories néo-riemanniennes*. Paris-Sorbonne - Patrimoines et langages musicaux. <http://www.plm.paris-sorbonne.fr/Textes/NMVH+NR.pdf> (accessed November 20, 2008), 3.

<sup>13</sup> Bernhard, Christoph. *Op. cit.*, p. 42.

<sup>14</sup> *Ibidem*, p. 83.

<sup>15</sup> *Ibidem*, p. 71.

the poetic text. In its Aristotelian definition, the notion of passion indicates a state in which a passive object is subordinated to the action of another object<sup>16</sup>. This definition corresponds to the principle which theory of rhetoric imposes on dissonances, assigning them two principal functions: *delectare*, i.e. to decorate and *movere*, to move emotionally. Thus, the concept of passion implies a directional drive whose musical translation is partly

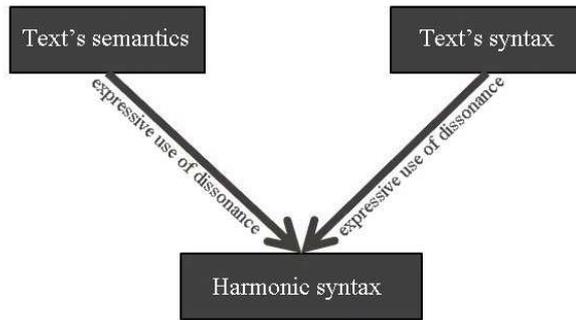


Figure 4: Interaction between the text and the harmonic syntax.

accomplished by the use of the dissonance because of the directional tendency that it implies. This analogy is fully illustrated in the introduction of the *Lamento d'Arianna* where the escape from despair via death is translated into music by the dissonances and their resolution. Two figures of *syncopatio* are used for this purpose: the highly expressive 9<sup>th</sup> in bar 1 on *lasciatemi* and the 7<sup>th</sup> in bar 7 whose resolution helps to emphasize the term *morire*. This demonstrates a point that is key to my hypothesis. The use of these expressive dissonances contributes indirectly to the asymmetry of root progressions while supporting dominant vectors by the preparation and resolution of the dissonances: the preparation of the dissonance bar 1 implies a fundamental step of an ascending fourth (vector +4) during the preparation (it does not generate any chord progression at the point of its resolution). The dissonance at bar 7 leads to an upwards fundamental step (vector +2) at the time of its preparation and a ascending fourth (vector +4) at the time of its resolution. All these progressions belong to the category of the dominant vectors.

The correlation between the text's syntax and the harmonic syntax can be established via the grammatical concept of transitivity that applies not only to verbal language, but also to harmonic syntax, as has been underlined by Nicolas Meeùs<sup>17</sup>. In his cognitive approach to transitivity, the linguist Jong-Seok Soh defines a transitive construction as basically asymmetrical<sup>18</sup>. According to his definition, transitivity implies the vector cause-effect and the concept of causally dependent chains of phenomena.

Legend for vectors:

Dominant vectors	
+4 :	→
-3 :	→
+2 :	→
Subdominant vectors	
-4 :	←
+3 :	←
-2 :	←

Example 1: Monteverdi, *Lamento d'Arianna*; 1. *Lasciatemi morire*, bars 1-8.

<sup>16</sup> Aristotle. 1986. *On the soul*, trans. by Hugh Lawson-Tancred. Harmondsworth: Penguin Books, pp. 201- 216.  
<sup>17</sup> Meeùs, Nicols, 1992. Une approche cognitive de la tonalité, transitivity, rection et fonctions tonales. *Analyse musicale*, February: pp. 26-29.  
<sup>18</sup> Soh, Jong-Seok. 2002. *Transitivité sémantique et ses corrélats conceptuels*. PhD diss. Paris IV, p. 11.

In Western music, this definition corresponds to the asymmetrical relation that is established between dissonance (characterized by imperfection and instability) and consonance (characterized by perfection and stability). I do not mean to suggest that harmonic syntax is directly conditioned by verbal syntax. However, one can assume that the attempt to translate verbal syntax into musical syntax may well have helped to develop tonal harmonic syntax. The extract of the *Lamento d'Arianna* quoted above demonstrates this analogy. The initial exclamation *Lasciatemi morire* can be considered as an asymmetrical construction in which the imperative *lasciate* necessarily requires its complement *morire* in order to complete the meaning of the sentence. This bond is transposed to musical syntax by the use of an unprepared dissonance on *Lasciatemi* which is resolved on *morire*. Thus the incompleteness of the verb is translated into music by the incompleteness of the dissonance requiring the resolution by a consonance. This transposition of verbal syntax, insofar as it is accomplished by the use of the dissonance, contributes to the asymmetry of root progressions by causing dominant sequences. Here it implies a vector +2.

### *Freer and more varied use of dissonance*

Bernhard's theory of figures establishes a distinction between a superficial and an underlying structure of counterpoint. According to this concept, which would be retained by many German theorists and in particular by Heinichen, the apparently irregular treatment of the dissonance in *seconda pratica* can always be reduced to a contrapuntal framework which is in line with *prima pratica*. The reduction of expressive licence and freedom to strict counterpoint<sup>19</sup> is confirmed in the central part of *Lasciatemi morire* where, in bar 13, a note-against-note 7<sup>th</sup> occurs — this being formally proscribed in *stile antico*. Although this 7<sup>th</sup> is reached simultaneously by contrary motion in the bass and alto (E-D), it is implicitly prepared in the tenor part which sounds the D in bar 12. Thus the rules of preparation and resolution, which contribute to asymmetry, are respected in the counterpoint's fundamental structure which can be reduced here to fauxbourdon. As a consequence, the preparation and resolution of the expressive dissonance (used here in order to translate into music the word *dura*), affects harmonic progressions by implying dominant vectors.

The image shows a musical score for Monteverdi's *Lamento d'Arianna*, bar 13. It is divided into two parts, a) and b). Part a) shows the vocal lines (Alto, Tenor, Bass) with lyrics 'in co - si du - ra - sor - te'. Part b) shows the same lines with a different harmonic structure. A legend on the right defines dominant vectors (+4, -3, +2) and subdominant vectors (-4, +3, -2) with arrows indicating direction. Below the score, arrows indicate the root progressions for the alto and bass parts.

Example 2: Monteverdi, *Lamento d'Arianna*; 1. *Lasciatemi morire*, bar 13.

The freer treatment of dissonance in *stilo moderno* has two other indirect implications. On the one hand, the freer and more varied use of dissonance facilitates their use. Since they are used more frequently, they contribute to the asymmetry of root progressions. On the other hand, it implies a phenomenon of fusion between the characteristic elements of *syncopatio* and *transitus*. This phenomenon, which encourages the downward resolution of passing notes is obvious in the final section of *Lasciatemi morire*, where the initial consonant intervals of

<sup>19</sup> Siegele, Ulrich. 1994. Cruda Amarilli oder Wie ist Monteverdis „seconda pratica“ satztechnisch zu verstehen? In *Claudio Monteverdi, vom Madrigal zur Monodie*. Musik-Konzepte, Heft 83/84: pp. 31-102. München: Text + Kritik.

the passing notes are absent. In example 3, the missing notes have been added and framed. The contrapuntal irregularity corresponds to the figure of *ellipsis* and to the first case of *heterolepsis* described by Bernhard. According to Heinichen, this figure appears especially in the case of the passing note's downward resolution<sup>20</sup>, which is confirmed in the example. On the six *heterolepsis* which can be found in the extract, four of them are resolved

by downward resolution and only two reach the consonance by upward motion. It is precisely the downward resolution which provokes the dominant progressions: the single sub-dominant chord progression (vector +3), bar 31, is accompanied by one *heterolepsis* with upward resolution, whereas the other expressive dissonances occur with dominant vectors -3, +4 and +2.

Example 3: Monteverdi, *Lamento d'Arianna*; 1. *Lasciatemi morire*, bars 29-34.

### More frequent use of dissonance

It is above all the comparatively more frequent use of dissonance in *stile moderno* than in *stile antico* which tends to emphasize the asymmetry of root progressions. The more frequent the dissonances, the more they are able to affect chord sequences and to emphasize the asymmetry of root progressions. This correlation between dissonances' frequency and the asymmetry of root progressions is corroborated by the statistical analysis of *Cantai un tempo* and *Lasciatemi morire*. These analyses have been performed by the software *Telos I*<sup>21</sup>. The diagrams of figure 5 illustrate the results of the synchronic analysis. They show that in *Cantai un tempo*, asymmetry between the dominant vectors (dark grey segments totaling 20.43% + 42.12% i.e. 62.55% of chord sequences) and the sub-dominant vectors (light grey segments totaling 31.92% + 5.53% i.e. 37.45% of all progressions) is relatively low: it is about 25.10% (62.55%-37.45%). On the other hand, asymmetry is extremely high in *Lasciatemi morire*: it implies 70.22% (85%, 11-14.89%) of all chord sequences. If the vectors implied by dissonances are isolated (emphasized by texture), we see that the extreme disparity between dominant vectors and sub-dominant vectors that occurs in *Lasciatemi morire* is due mainly to the use of dissonances, whereas the less marked asymmetry in

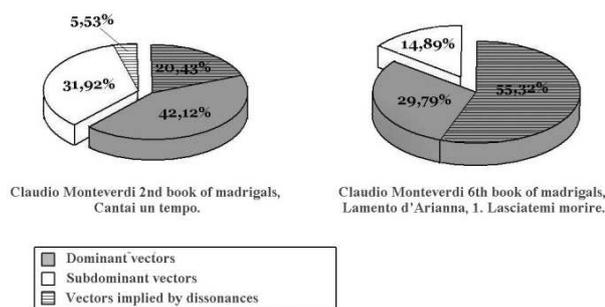


Figure 5: The ratio of dominant to sub-dominant vectors in *Cantai un tempo* and *Lasciatemi morire*.

*Cantai un Tempo* is partly due to their less frequent use. The diachronic analysis, illustrated by the two graphs of figure 6, confirms the bond between the frequency of the dissonances and the asymmetry of root progressions.

<sup>20</sup> Heinichen, Johann David. 1956. *Der Generalbass in der Composition*. Dresden: Bey dem autore, p. 601. Heinichen does not use the term of *heterolepsis* employed by Bernhard, but his explanations are to two types of the figure described in the *Tractatus*.

<sup>21</sup> The software and its instruction manual can be downloaded on the site of the *Université de Paris Sorbonne, Patrimoines et langues musicaux*. <http://www.plm.paris-sorbonne.fr/VHLogiciels.shtml> (accessed November 20, 2008).

The graphs show the fluctuation of total asymmetry and asymmetry implied by the dissonances within the piece. Asymmetry is calculated for a definite number of chord sequences (15 sequences in this case) and is recomputed by moving the observed sample by increment of one chord progression until the end of the work. The vertical axis refers to the asymmetry whereas the horizontal axis refers to the sample for which the asymmetry has been calculated. In both works, the amplitude of total asymmetry (bold line) is partly connected with the fluctuation of the asymmetry implied by the dissonances (dotted line). At the beginning of *Cantai un tempo*, one notices a strong correlation between both asymmetries which is maintained until sample 76. When asymmetry implied by the dissonances drops substantially (after sample 76) the total asymmetry is reversed on several occasions to privilege the sub-dominant vectors. In *Lasciatemi morire* on the contrary, the significant asymmetry implied by the dissonances is relatively constant and remains definitely correlated with total asymmetry during the whole work. Tendency curves (the polynomial tendency of the 4<sup>th</sup> degree is represented by the thin lines) highlight the progressive stressing of total asymmetry as one approaches the end of the work. This confirms Lowinsky's hypothesis mentioned above according to which tonality, and, by extrapolation, chord sequences characteristic of tonal syntax were, propagated in the piece starting at the final cadence.

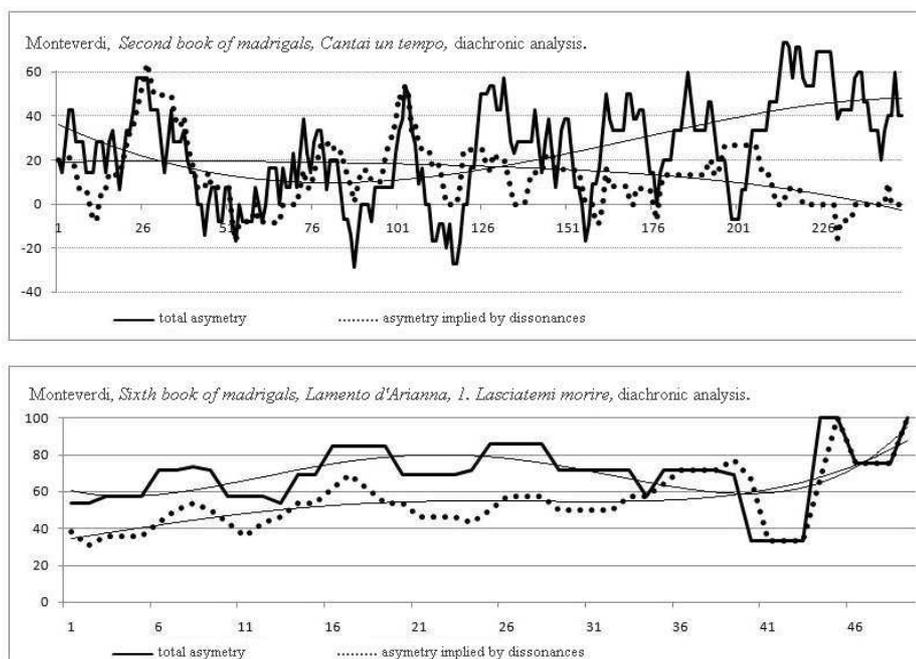


Figure 6 : Diachronic analysis.

These results lead to several observations. They tend to confirm the link which can be established in theory between the frequency of dissonance and the asymmetry of root progressions: the more the dissonances are used (in order to express the poetic text) the more they affect fundamental bass progressions by privileging dominant vectors and excluding subdominant progressions. This corroborates Zingerle's argument that the birth of tonality is the result of a selection of certain chord sequences<sup>22</sup>. In addition, the results suggest that the asymmetry is not only due to the use of dissonance: even if you isolate the asymmetry implied by these dissonances, a residual asymmetry (which cannot be explained by preparation and resolution) remains in both pieces. Lastly, the results demonstrate that the asymmetry of root progressions is present — not only in works of the *seconda*

<sup>22</sup> Zingerle, Hans. 1951. *Die Harmonik Monteverdis und seiner Zeit*. Wien: Edition Helbling, pp. 6-10.

*pratica* — but also in works belonging to the *prima pratica*. This confirms the hypothesis that the asymmetry does not appear abruptly at the beginning of the 17<sup>th</sup> century with the advent of tonality<sup>23</sup>. On the contrary, asymmetry, which can already be perceived in the 16<sup>th</sup> century, gradually becomes more accentuated and stabilized through the use of dissonances insofar as the search for musical expression and description intensified.

## Conclusion

The present paper has tried to establish that one of the main aspects of tonal functioning, namely the directional tendency of chord progressions, depends on subjective artistic choices inherent in Western music; choices that are in part founded on Aristotelian thought. The aesthetic ideal of *seconda pratica*, namely the expression of the passions and the subordination of music to the poetic text, may well have been a decisive factor in the increase of asymmetry. Accordingly, one of the essential characteristics of tonality have been encouraged by the change of aesthetic paradigm from *stile antico* to *stile moderno*. It is not a question here of reducing the operation of tonality to this single aspect and ignoring another of its characteristics: gravitation around an established tonal center which can be associated to platonic thought. My aim has simply been to emphasize how a historical process could have contributed to an isolated aspect of tonal functioning. Analysis carried out with a view to testing this hypothesis points to two different elements: on the one hand, it tends to confirm a strong correlation between the frequency of the dissonance and the fluctuation of asymmetry. On the other hand, it shows that the asymmetry cannot be explained solely by the use of dissonance. Residual asymmetry that is found in many works concerns other factors that are related to the principle of consonance to which the intervallic sequences are subjected. Nevertheless it is clear that the increased use of the dissonance, from the second half of the 16<sup>th</sup> century onwards, could have operated on harmonic syntax as a filter by excluding the sub-dominant sequences and implying dominant progressions. From this perspective, the expressive and descriptive use of dissonance in *seconda pratica* may well have contributed to the advent of tonality.

## Abstract

The theory of harmonic vectors identifies the asymmetry of root progressions as one of the outstanding characteristics of tonal harmony. One of the possible origins of this phenomenon is the treatment of the dissonance — through which the rules of preparation and resolution have repercussions on harmonic sequences. This paper seeks to determine if the evolution of the treatment of the dissonance, along with the change of the aesthetic paradigms from *prima pratica* to *seconda pratica*, is to be considered as one of the main causes of asymmetrical progressions and could have contributed to tonal syntax. This evolution will be described with reference to Christoph Bernhard's theory of figures. Two examples, one in *stile antico* and the other in *stile moderno*, will show the correlation between extra-musical references, the usage of dissonance and the direction of the harmonic progressions, both in the overall statistics and in the local fluctuations of asymmetry through the work. The anal-

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<sup>23</sup> Tymoczko, Dimitri. 2003. Progressions fondamentales, fonctions degrés : une grammaire de l'harmonie tonale élémentaire. *Musurgia X*: p. 43.

ysis will highlight the dissonance's impact on the fluctuation of asymmetry through a given work and will indicate some general tendencies.

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