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Composing the Coda: An Empirical Study Identifying Prototypical Symphonic Sonata-Form Codas in the Works of Haydn, Mozart and Beethoven

COMPOSING THE CODA:

AN EMPIRICAL STUDY IDENTIFYING

PROTOTYPICAL SYMPHONIC SONATA-FORM

CODAS IN THE WORKS OF

HAYDN, MOZART AND BEETHOVEN

James Alexander Garry Crackle

A thesis submitted to the University of Huddersfield in partial fulfilment of the requirements for the degree of Doctor of Philosophy

School of Music, Humanities and Media

University of Huddersfield

June, 2019

Copyright Statement

To the Memory of:

Pamela Rose and Peter Haslegrave

Acknowledgements

With Thanks to:

Doctor Steven Jan, whose continued help and numerous suggestions have improved my work immeasurably.

Christine Noxon, who read early drafts and offered many helpful suggestions.

My family and friends, who have provided continuous support and endured the best and worst of this experience.

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Abstract

This thesis offers a new approach to the study of the coda in one of the most familiar topics in the field of music: the study of sonata form in the works of Haydn, Mozart and Beethoven. As with all fresh approaches, it draws from several current works on this subject, whilst also providing new views on the coda and approaches to multi-movement and multi-work analysis. In addition to considering the study of the coda using a prototype-statistical methodology, this thesis provides a foundation for examining works and genres by composers beyond the thesis sample.

From one perspective, this thesis is a research report outlining the findings from the analysis of 333 individual sonata-allegro and sonata-rondo movements by Haydn, Mozart and Beethoven. However, this work does not only represent a significant analytical undertaking: it also identifies patterns in the composition of the coda, establishing generalisations previously thought not to exist. Although the theoretical discussion of the eighteenth and nineteenth centuries is important, the preference in this thesis, like Hepokoski's and Darcy's *Elements*, is to let the composers themselves teach us how codas work (2006, p. v).

The thesis is divided into three parts. The first part, Chapters One and Two, outlines the reason for a fresh perspective on the coda and the approach undertaken. In the second part, Chapters Three and Four, eight methods for identifying a coda are established. This is followed by a numerical survey of the sample of sonata-form movements, discussing the four different methods of achieving movement closure (including the use of a coda) and the three methods used to integrate a coda (when present) into the recapitulation. The third part, Chapters Five, Six and Seven, explores the organisation of the coda in the symphonic first and final sonata-form movements by Haydn, Mozart and Beethoven, establishing prototype parameter baselines with which to compare, numerically, each individual coda from its respective composer sample. The final chapter (Chapter Eight) amalgamates the findings of the thesis, creating a definition of the coda based on the generalisations identified not only exclusively for the three composers, but also for the entire thesis sample.

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Chapter One – Introduction

1.1 Introduction

The term 'coda' refers to 'the last part of a piece or melody, with the implication of some addition being made to a standard form or design' (Bullivant and Webster, 2001). Found in multiple forms and genres, including canons, fugues and variations, the term 'coda' is possibly one of the most recurring structural terms in music. Of all its current uses, 'the most important use of the term coda is in sonata form' (2001). Within the study of sonata-form, the coda receives the most discussion in the works of Haydn, Mozart and Beethoven. Definitions of the coda establish the frequency of its use as an extension of sonata form, alongside identifying its position within a sonata-form movement. More in-depth definitions provide details regarding the organisation and function of the coda, whilst offering additional sub-terminology in order to understand further this structural section.

These definitions identify the coda as a section located after the end of the recapitulation (Bullivant and Webster, 2001). It usually comprises eight or sixteen [bars] (Leichtentritt, 1967, p. 54). Definitions highlight that the coda functions to 'round out the tonal outline…, exploit some of the previous thematic material' (Newman, 1983, p. 158), and 'saturate the listener with the tonic' (Rosen, 2005, p. 394), explaining that this is achieved by a 'firm return to the tonic, generally with the opening theme' (Ratner, 1980, p. 230) and 'a closing section comprising a series of codettas' (Caplin, 1998, p. 179). These definitions are valuable in our understanding of the coda in sonata-form movements such as the third movement of Mozart's Symphony K. 161 and the fourth movement of Haydn's Symphony No. 23. These codas are, as the definitions state, between eight and sixteen bars long with large proportions of tonic harmony 'saturating the listener'.

1.2 Issues with Coda Study

Unfortunately, although the Section 1.1 definitions and descriptions of the coda may be applicable to a sample of music which contains this structural section, in reality they are only applicable to a small, undefined sample of codas. The definitions in the previous paragraph are inaccurate and ineffective when applied to movements in sonata form, such as the fourth movement of Mozart's Symphony K. 551, the fourth movement of Haydn's Symphony No. 90 and the fourth movement of Beethoven's Symphony No. 8, which contain longer, more complex codas. It is difficult to suggest that the only function of these codas is to round out the tonal outline and exploit some of the previous thematic material. Each of these codas is over four times as large as Leichtentritt's definition and in the example of the fourth movement of Beethoven's Symphony No. 8, the coda is twice the length of the exposition, development and recapitulation, individually. The coda of this movement cannot be simply referred to as 'the last part of the piece' (Bullivant and Webster, 2001). Rather, it 'may be fruitfully considered the goal of the entire movement' (Rosen, 1988, p. 331). Clearly, the definitions detailed in Section 1.1 are contradictory to the meaning of the coda in this second sample of movements.

A review of coda literature further highlights the conflict between different views on the coda, indicating that there appears to be no consensus on what a coda is and what it should involve. Not only are the perspectives of the coda conflicting, but many of them are vague, uninformative and not applicable to a large sample of codas.

1.2.1 Literature Review

Etymology and Definitions of the Coda

The basic etymological derivation of the term 'coda' is not difficult to trace: 'coda' is the Italian word for 'tail'; it comes from the Latin 'cauda', which has the same meaning

(Smyth, 1985, p. 7). It is perhaps therefore of no surprise why the coda is used to describe material which comes at the end (tail) of a musical movement. However, as Smyth identifies, 'in Italian, the word has two subtly different shades of meaning: "tail" in the physical sense (opposite of head) and "tail" in the metaphoric sense (a lengthening or an appendage)' (Smyth, 1985, p. 11). It would appear from studying early definitions of the term 'coda' that it was the metaphoric sense of the term which was originally adopted in musical form.

In a 1275 treatise, 'Anonymous IV describes "caudae" as melismatic interludes found in some conductus. He speaks of caudae with approval, saying that conductus which lack them are intended for singers of lesser ability, and are of lower artistic merit' (Smyth, 1985, p. 8). Referenced in Walther's *Musikalisches Lexikon,* the coda is described as 'den Schwanz an den Noten [translation: the tail of the notes]' (1732, p. 174), and was used to define an entire class of semibreve signatae in fourteenth-century Italian notation. Brossard and Grassineau, in a musical dictionary, state as a secondary meaning that 'in ancient compositions the coda occurs when one part continues on a sound which is its cadence, while the others proceed to modulate for four, five, six, eight, or more bars' (1740, p. 33).

Anger, at the end of eighteenth century, uses the term 'coda' to describe the addition of irregularity to a musical sentence. He states (1900, p. 15) that irregularity may be introduced into a musical sentence by:

- the extension of a phrase,
- the contraction of a phrase,
- one phrase overlapping another,
- the addition of a coda.

What is noticeable about these definitions, which date from 1275 to 1900, is that they suggest that, as long as the coda functions to add decoration and elongate or expand the musical sentence or cadence, it can be located at any point of the music. Interestingly, there are some twentieth-century writers (Tovey and Rosen among them) who have used the term for certain non-final passages (Smyth, 1985, p. 34). In a discussion of the trio from the minuet of Haydn's Symphony No. 85, Rosen states that 'the coda is, of course, a retransition' (1988, p. 118), rather than a method of movement closure. Furthermore, he suggests that the coda may sometimes be found before the concluding bars (1988, p. 297) of the movement.

Given the suggested movable position and decorative function of the coda in a musical work, the early use of the coda, as a device as opposed to a term, appears to be more akin to that of a cadenza than of the modern coda. This is not an unfounded connection, and both Kuschnir and Smyth view the improvised cadenza as the historical source of the coda. Kuschnir states 'Die Wurzeln der grossen Coda oder der Ziel- (Schluss-) durchführung reichen zweifellos in die ad libitum-Kadenzen des Instrumentalkonzerts und die Arie zurück.'[1] (in Smyth, 1985, p. 11). The primary reason for this association as Smyth highlights is owing to the fact that both cadenzas and codas tend to be built from the thematic material of expositional first subject (1985, p. 11). Regardless of the 'true' origin of the coda, its use prior to the eighteenth century appears to be to describe anything which is added onto the end of something else and not solely something which occurs at the end of a work.

The earliest record found regarding the coda as an additional section specifically added onto the end of a work or movement can be found in Brossard and Grassineau's 1740 musical dictionary. Not only do they note the function of the coda in 'ancient compositions' but they also provide the following definition: '[A] tail, we often find at the end of a canon or fugue, two or three measures to end with, after having repeated them [several] times and this is what the Italians call Coda' (1740, p. 33). This definition takes precedence over the definition regarding its meaning in 'ancient compositions' (the latter definition is reduced in font size and follows the first definition). It is not until towards the end of the nineteenth century

[1] Translation: 'The roots of the great coda or the target (final) development reach undoubtedly back to the ad libitum cadences of the instrumental concerto and aria'.

that the term 'coda' begins to lose its earlier connotations and is used solely to refer to an additional passage found at the end of a work or movement. In Riemann's 1882 dictionary of music the coda is described solely as 'a closing section in movements with repeats' (p. 153).

Definitions of the Coda in Sonata Form

Sonata form has provided composers with a 'vehicle for some of their finest expressions of musical thought' (Smyth, 1985, p. 177). The last five decades have seen major studies of this form with many significant breakthroughs stimulated largely as a result of studies by: Caplin (1998), Hepokoski and Darcy (2006) and Rosen (1988). However, although these studies have contributed a good deal to our understanding of sonata-form expositions, they have, in fact, been less effective in broadening our understanding of the sonata-form coda beyond the definitions of the eighteenth and nineteenth centuries. This lack of a developed understanding can be seen clearly in the comparison of definitions presented for these two sections.

If the definition of the exposition in a sonata-form movement were to be looked up in a theoretical textbook, journal or dictionary, the initial definition presented would most likely resemble, or would be, one of the following:

> The exposition resembles the first division… The statements of the principal and subordinate themes are in contrasting but related tonalities. A transition connects them in all but the simplest cases. A distinct contrast of character helps to distinguish the various themes, though analysis will demonstrate their inter-connexion through some use of basic motive-features (Schoenberg, 1999, pp. 201– 202).

> The exposition or part [one]… sets forth the principal thematic material of the entire [sonata-form] movement… The [two themes] are contrasted one with the other in style

> and key. The first subject is invariably in the tonic key [with a] strongly marked and definite character (MacPherson, 2006, p. 120).

> Exposition: In a composition or movement, the section at or near the beginning during which one or more themes on which the rest of the movement or piece is to be based are first presented according to a particular plan… It opens in the tonic and invariably concludes in a new key, by convention the dominant in major-key movements and the relative major in minor-key ones (Walker, 2001a).

> In a sonata-form exposition, the *main theme* expresses the home key through cadential closure. Likewise, later-occurring *subordinate theme* confirms the subordinate key. Standing between these two functions is a *transition*, a theme-like unit that destabilizes the home key and (usually) modulates to the subordinate key (Caplin, 1998, p. 17).

Although only snippets of a larger study, these are clear, concise and generally unanimous, providing both a brief compositional and functional understanding of the exposition section. This is not to suggest that all exposition definitions conform, or that every movement follows the generalised definitions. As Klorman states, ‘one need look no further than Mozart's *Sonata facile* in C major, K.545, to find an exposition whose transition remains in the original key (rather than modulate to the dominant)’ (2016, p. 2).

In comparison, definitions of the coda provide very little in-depth information, often embellishing the definitions of the eighteenth and nineteenth centuries:

> Coda: The last part of a piece or melody, the implication being of some addition being made to a standard form or design. The most important use of the term ‘coda’ is in sonata form, where it refers to anything occurring after the end of the recapitulation (but not to an expansion within the recapitulation before its original Codetta or closing is reached…) (Bullivant & Webster, 2001).

> The coda is a shorter or longer appendix at the end of a sonata movement or any other form. Not all sonatas, however, make use of a coda (Leichtentritt, 1967, p. 155).

> … a coda… is used… not only to round out the tonal outline but to exploit some of the previous thematic elements in a new light. The coda may have all the surprise and charm, then, of a punch line in a short story… (Newman, 1983, p. 158).

> By the end of the recapitulation, the fundamental melodic, harmonic and tonal processes of a movement have generally achieved closure… Frequently, the composer adds a 'coda', an optional section that follows, and is fully distinct from, the recapitulation (Caplin, 1998, p. 179).

Unfortunately, these definitions, although identifying the coda as a section added on to the end of a movement (a premise established in the eighteenth century), do not appear to provide any detailed or conforming insight into how often the coda appears in a sonata-form movement, the methods used for its identification, and the function of the coda within sonata form. Cavett-Dunsby's article on Mozart's codas begins by discussing the lack of attention Schenker gives the coda during his analysis of the finale of Beethoven's Eroica Symphony. As Cavett-Dunsby states, 'The graph ends where Schenker thinks the coda begins. He simply notes "etc.", with no [further] explanation' (1988, p. 31).

Appearance of the Coda in Sonata Form

Bullivant and Webster's and Newman's descriptions contain no information regarding the frequency in which the coda appears in sonata-form movements. Leichtentritt highlights that not all sonatas make use of a coda. However, he does not provide any further detail regarding this observation. Are sonatas that contain a coda the majority or the minority? Caplin describes the coda as an 'optional section' (1998, p. 179), in the works of Haydn, Mozart and Beethoven, but again does not quantify this statement. Furthermore, although this statement may be true for selective samples of works by the three composers, it can also be an inaccurate and misleading generalisation. As will be discussed in Section 4.2.5 (p. 174), all the symphonic sonata-form first and final movements by Beethoven contain a coda. If in these movements, the coda is as common as the exposition, development and recapitulation, how can it be labelled as 'optional'? Finally, in addition to the definition provided above, and in contradiction with Caplin's definition, Cole states that in the works of Beethoven and post-Beethoven, the coda is a 'structural necessity' (1997, p. 41).

Identification of the Coda in Sonata Form

Although numerous theorists, including Bullivant and Webster, suggest that the coda follows after the end of the recapitulation, there still appear to be inconsistencies regarding its starting location within a movement. An example of this can be found in Schoenberg's and Grove's analysis of the coda from the first movement of Beethoven's Symphony No. 3. Schoenberg suggests that the coda begins at b. 557 (1999, p. 185), but Grove suggests the coda begins at b. 551 (1896, p. 68). Neither Schoenberg, nor Grove, justify their starting bar for the coda. This lack of conformity with regard to the identification of the starting bar of a coda appears to stem from the lack of a systematic methodology. An example of this can be found in the comparison of Hepokoski and Darcy's, Rosen's and Caplin's methods for identifying the beginning of the coda.

Hepokoski and Darcy state that to identify the start of the coda one must identify the referential or correspondence measures in the recapitulation which recapture the way in which the exposition has ended (2006, pp. 281–282). In addition to Hepokoski and Darcy's definition, Rosen suggests that 'a return to the first bars of the development is a logical point of departure for a coda' (1988, p. 310). Caplin further identifies, that 'on few occasions, the start of the coda is unambiguous: the recapitulation is clearly over… the texture changes, and a new initiating unit begins the coda' (1998, p. 181).

Although in theory, these three methods for identifying the start of the coda could exist simultaneously (i.e., the recapitulation ceases to retrace the material of the exposition, suggesting an end to the recapitulation, and the coda begins with a significant textural change and restatement of material from the development), in reality these three methods create conflicting views regarding the start of a coda. For example, if Hepokoski and Darcy's methodology is applied to the final movement of Mozart's Symphony K. 338, the start of the coda is identified at b. 277. However, if Rosen's methodology is applied, the start of the coda is identified at b. 285 and if Caplin's methodology is applied, the start of the coda is identified at b. 269.

With such a diverse range of coda starting points, a number of varying and conflicting observations could be made regarding the coda. Based on the bar identified by Rosen, it could be generalised that the coda begins with material from the development section. However, based on the bar identified by Hepokoski and Darcy, it could be generalised that although the coda does not begin with material from the development section, it does contain restatements of development material during the coda. Finally, the bar identified by Caplin suggests that the coda can begin at any point during the restatement of exposition material in the recapitulation. How can we analyse, comprehend and generalise the coda when we are unable to identify where the section begins?

Function of the Coda in Sonata Form

With regard to the function of the coda there is again conflicting opinion. Cole's definition of the coda suggests that it 'functions to give a stronger sense of finality' (1997, p. 159), whilst Newman's definition suggests that the coda completes the tonal outline and exploits previous thematic material. Perhaps by completing the tonal outline, the coda creates a greater sense of finality. Unfortunately, Cole does not provide any further detail regarding how this function is achieved. Newman's view is supported by Rosen, whose definition suggests that the primary function of the coda is to 'saturate the listener with the tonic' (2005, p.

394). If the coda functions to create a greater sense of finality by reinforcing the tonal outline and saturating the listener, how do we explain codas such as that in the first movement of Beethoven's Symphony No. 3, which measures 135 bars in length?

Caplin's definition suggests that the tonal element has generally achieved closure by the end of the recapitulation (1998, p. 179). This contradicts the definitions by Newman and Rosen making the coda surplus to requirements. If the recapitulation successfully resolves the tonal tensions of the movement through establishing and reinforcing the tonic, which it presumably does in movements not containing a coda, why is a coda required?

Schoenberg's definition of the coda further contradicts the definitions of Newman and Rosen and suggests that the coda has no definable form or function as a result of its nature. He argues that:

> the assumption [the coda] serves to establish the tonality is hardly justified; [the coda] could scarcely compensate for failure to establish the tonality in the previous section. In fact, it would be difficult to give any other reason for the addition of a coda than that the composer wants to say something more. This may also account for the observed diversity of shape and size (1999, p. 186).

Although this definition questions the tonal definitions of Newman and Rosen, it does identify that the coda may vary in shape and size dependent on what additional material the composer wishes to include. This definition compensates for the differing lengths of codas found in the final movements of Haydn's Symphonies Nos. 23 and 90, Mozart's Symphonies K. 161 and 551, and Beethoven's Symphony No. 8, discussed in Sections 1.1 (p. 25) and 1.2 (p. 26). However, although it may highlight a diversity of shape and size with regard to the coda, it does not provide any specific details. What is the most common length for a sonata-form coda? Of the sample identified, are the smaller length symphonic codas anomalies, or are they examples of the majority?

With the exception of the contradictory definitions regarding the tonal function of the coda and the vague descriptions concerning its length, limited effort has been made to identify and quantify the characteristics of the sonata-form coda. Definitions that do exist are hedged by words which do not suggest a definite or assertive expression of opinion. For example Hepokoski and Darcy state that the coda '*could* begin with a restatement of the primary theme or an obvious adaption thereof' (2006, p. 284); and it '*may* momentarily "lose" the tonic secured at the ESC [Essential Structural Closure] by slipping into nontonic keys' (2006, p. 283, my emphasis).[2] Although it is to be expected that the characteristics identified will not be representative of every coda, studies by theorists such as Hepokoski and Darcy and Caplin make very little effort to quantify how often these generalisations appear in their selected samples. How common is it for codas to begin with a restatement of the primary theme and how often do codas slip into non-tonic keys? Do these attributes represent a large proportion of codas or a selective minority?

The Codetta

In Bullivant and Webster's (2001) definition, the position of the coda is referenced with regard to the codetta. This further complicates matters, for not only is the definition of the coda ambiguous, but the term 'codetta', which is frequently used in the description of the coda (e.g., 'the coda itself ends with a closing section comprising a series of codettas' (Caplin, 1998, p. 179)), is equally vague, with definitions often referring to the codetta as 'a brief coda… often used to describe any short conclusion to a movement or piece' (Walker, 2001b).

An interpretation of Riemann's definition of the codetta, which states that the codetta is simply 'a short coda' (1882, p. 153), could suggest that the term was originally introduced to describe additional passages tagged onto the standard form of the movement, but which

[2] An additional example of a coda description lacking an assertive expression of opinion can be in the review of Caplin's 1998 *Classical Form: A Theory of Formal Functions for the instrumental Music of Haydn, Mozart and Beethoven* (Section 1.2.2).

were insufficient in length to justify the term ‘coda’. Given that Riemann’s definition of the coda indicates that the coda is found at the end of a movement, it can be presumed that the term ‘codetta’ represents short additional passages found at the same position. Furthermore, not only does this definition suggest a prescribed minimal length for a coda, but with regard to sonata form, the definition also suggests an additional method for closure. Given that the coda is an optional extra and not found in all sonata-form movements, movements which do not contain a coda will often conclude with the repeated closing material of the exposition in the recapitulation.[3] However, Riemann’s definition also suggests that a movement can be terminated with a third method: a short additional passage, which he labels ‘codetta’. What Riemann does not explain is what constitutes a significant additional passage (coda) and what constitutes a short passage (codetta).

Interestingly, it is Leichtentritt’s definition of the coda which provides a possible solution. In his study of the coda, Leichtentritt suggests that there are two species of coda. The first is a large additional section, independent enough to stand alone from the rest of the sonata-form movement and to be regarded as a fourth section; the second is a shorter coda which elaborates the end of the movement (1967, pp. 155–157) with a ‘few emphatic chords or cadential gestures’ (Ratner, 1980, p. 230). In my opinion, what Leichtentritt describes as a shorter, elaborative coda is analogous to what Riemann defines as a codetta. By applying Leichtentritt’s definitions to Riemann’s terminology, for a section to be regarded as a ‘coda’ it must be able to stand independently from the rest of the movement to which it is attached. However, if the additional section is not substantial enough to stand apart from the movement to which it is attached, and it consists mainly of emphatic chords or cadential gestures, the section could be regarded as a ‘codetta’.

[3] Examples of these operations for terminating a sonata-form movement can be found in Section 4.2.

Scholes' definition of the 'codetta' also suggests that the term can be used to describe a short ending found at the conclusion of a work or movement. However, he also states that 'the coda at the end of the exposition is sometimes, for distinction, called the codetta' (1970, p. 200). This could suggest that the term 'codetta' was introduced to replace the term 'coda' when it was used to describe anything other than an additional passage at the end of a movement. Although this is a possible connection between the coda and codetta, Scholes' definition also conflicts with the modern interpretation of the term 'coda' by suggesting that a coda can be present at the end of the exposition. By altering the position in which the coda and codetta can be found, Scholes' definition further complicates the understanding of these two sections.

Smyth describes the codetta as a passage which serves to enhance local closure (1985, p. 14). This definition may, ipso facto, provide a link between the two different interpretations suggested by Riemann and Scholes. Smyth suggests that although the coda performs the function of closure on a large scale, the codetta can create closure at any point on a local scale. This would not only explain how the exposition can contain a codetta, but it would also provide an acceptable reason for a codetta *in* the coda. This concept links to Sanders' structural analysis of the fourth movement of Beethoven's Symphony No. 9 (Table 1.1) where he refers to the 'coda of the Coda'.

Table 1.1 – Structure of the Finale of Beethoven's Ninth Symphony.

[Bars]		
1–91	Introductory	First Exposition (incomplete)
92–187	Main Theme (four statements)	
188–202	Bridge	
203–207	A major; Key unstable	
208–240	Introductory	Second Exposition
241–320	Main Theme (three statements)	
321–330	Bridge	
331–431	Concluding Section: Bb major; "second theme" (two variations of the main theme in compound meter)	
431–542	*Development Section*	
543–590	Main Theme (one statement)	Recapitulation
591–654	Bridge (Subdominant; new theme)	
655–729	Concluding Section (double fugue in compound meter)	
730–762	Transition to Coda	
763–841	Section 1 of Coda	Coda
842–850	Transition	
851–903	Section 2 of Coda	
904–940	Section 3 of Coda (coda of Coda)	

(Sanders, 1964, p. 76)

On initial observations, Sander's breakdown of the coda from the fourth movement of Beethoven's Symphony No. 9, although providing a useful segmentation of the coda, reveals no great insight into the coda, unlike the descriptions of the exposition and recapitulation.[4] The term 'coda of the Coda' creates further complications because it uses the ambiguous term 'coda' to describe itself.

If Bullivant and Webster's (2001) interpretation of the coda is applied, then the term 'coda of the Coda' translates as the last part of the last part of the piece. Similar interpretations can be found when applying the definitions for coda by Leichtentritt – a short appendix

[4] It is worth noting, that the segregations and descriptions of the coda are still more insightful than those for the development.

added onto a longer appendix (1967, p. 155) – and Schoenberg – the composer wants to say more, having already said something more (1999, p. 186). However, these circular and tautologous interpretations of the term ‘coda of the Coda’ do not contribute a great deal to our understanding of the coda from the fourth movement of Beethoven’s Symphony No. 9. These definitions could suggest that the coda is not just a simple, through-composed section added to the end of a movement. Given that the coda can contain a coda, perhaps the coda contains its own internal form. Unfortunately there is no discussed or generalised theory regarding the form of the coda in the literature.

Newman’s (1983, p. 158) and Rosen’s definitions (1988, p. 118) of the coda, which suggest that the coda rounds out the tonal outline and saturates the listener with the tonic, could be definitions of what Sander’s describes as the ‘coda of the Coda’ – a final passage of emphatic perfect cadences and tonic chords. However, by using these definitions to describe the ‘coda of the Coda’ the remaining sections of the coda (e.g., the passages labelled ‘Section 1 of the Coda’ and ‘Section 2 of the Coda’ in the fourth movement of Beethoven’s Symphony No. 9) are no longer attributed a definition.

According to Smyth’s definition, Sanders is actually referring to the *codetta* of the coda. The function of this final section, and the codetta, is to create local closure for the closing section (coda) of the movement. This interpretation contains similar links with Anger’s use of the term ‘coda’ (1740, p. 33), where the coda is described as an expansion of a musical sentence or cadence at any point in the music. If this interpretation is correct, this would not only provide some insight into how the coda is organised and functions, but it would also provide a clearer understanding of the term ‘coda’ and ‘codetta’.

On observation of the definitions of the codetta, it is clear that the term carries numerous meanings with many of them overlapping with those associated with the coda. To avoid reinforcing the use of vague terminology and circular definitions found in previous studies, the term ‘codetta’ will not be used to describe any aspects of sonata form or the coda in this thesis. The material at the end of the exposition (and recapitulation) which is referred to as the ‘codetta’ by a number of theorists, including Scholes (1970), will be referred to as the ‘closing material’. Hepokoski and Darcy state that, for hermeneutic analysis, hairsplitting terminological distinctions are not relevant (2006, p. 282). However, in a theoretical and compositional study, these terms are paramount to gaining an informative and unambiguous understanding. How can the coda be explained with the term ‘codetta’ and vice versa when neither term is autonomous?

1.2.2 Previous Approaches to the Study of the Sonata-Form Coda

Unlike the opening discussion of the coda in Section 1.1 (p. 25), which falsely represented a picture of agreement, the review of literature on the subject has shown that, in reality, there appears to be very little conformity regarding the coda. Even within sonata form, which may contain ‘the most important use of the term coda’ (Bullivant and Webster, 2001), definitions and generalisations of this section are vague, conflicting and/or uninformative. Although it is possible to analyse the coda in individual pieces of music so that they are coherent and make sense, theoretically, as is evident in the literature, we are unable to create a standard definition that works for a wide range of music.

Cavett-Dunsby suggests that the analytical bias found in the study of the coda is a result of the strength of sonata-form theory formulated during the eighteenth and nineteenth centuries. ‘Marx and Riemann, for instance, whose writings span the second part of [the nineteenth] century, both concentrate on exposition and development sections and pay less attention to what follows’ (Cavett-Dunsby, 1988, p. 31). In addition to this, even when the coda is included in sonata-form studies it appears to be rarely accepted as a formal aspect of sonata form. Eighteenth- and nineteenth-century theorists viewed sonata form as a ‘two-part tonal structure, articulated in three main sections’ (Webster, 2001). These three ‘main’ sections comprised the exposition, development and recapitulation and this theoretical thinking has continued into contemporary studies. Rosen's first edition of *Sonata Forms* includes separate chapters on the exposition, development and recapitulation, yet only refers to the coda in passing.[5] Perhaps the issue with our understanding of the coda stems from the approaches taken to investigate sonata form and the samples used to devise definitions and generalisations. An examination of four studies (Caplin (1998), Rosen (1988), Kerman (1982) and Cavett-Dunsby (1988)) discusses the issues regarding the different approaches, the samples chosen and the identification of a coda. The approaches range from:

- attempting to create 'global' generalisations based on a large sample of works,
- identifying 'local' characteristics of a smaller, more refined sample,
- the individual study of a coda within a single movement in an attempt to identify how the coda functions.

William E Caplin (1998) Classical Form: A Theory of Formal Functions for the instrumental Music of Haydn, Mozart and Beethoven

'Rather than starting from scratch or adapting more recent critical, historical, and analytical research of the coda by Ratner, Rosen, LaRue, and others, Caplin looks back to the *Formenlehre* tradition promulgated by Schoenberg and his pupil Ratz' (Grave, 1998, p. 1). 'He aims to show how instrumental music by the great classical masters does indeed exemplify certain formal archetypes, and that a methodical dissection of the archetypes can furnish suitable tools both for analysing specific compositions and for drawing historically useful conclusions about style' (Grave, 1998, p. 2). Unlike Schoenberg, whose rules and theories were applied to composers extending from Bach to Brahms, Caplin creates his 'formal categories' (1998, p. 4) based on the instrumental music of Haydn, Mozart and Beethoven, with

[5] After the publication of Kerman (1982), which critiqued Rosen (1980) for not containing a chapter on the coda, a second edition was published (1988) which includes a chapter on the coda almost equal in size to the chapters on the exposition, development and recapitulation combined.

examples including Beethoven's String Quartet in F, Op. 135, Mozart's Clarinet Quintet in A, K. 581 and Haydn's Symphony No. 97 in C. 'Coaxing "abstractions based on generalized compositional tendencies" from a collection of masterworks famously packed with novelty is clearly an endeavour fraught with perils' (Grave, 1998, p. 2), and although Caplin should be commended for developing a methodology which engages with such a large sample, the size of the sample does raise issues.

Taking into account the size of the sample Caplin investigated, it is unlikely that he was able to engage with every instrumental work by Haydn, Mozart and Beethoven. If Caplin did not investigate every such work in the sample, then on what grounds were works deemed worthy of inclusion in the published study, and how well can the theories generated reflect the larger sample of works which were not? Furthermore, 'his categories represent abstractions based on generalized compositional tendencies in the classical repertory' (Grave, 1998, p. 2). Therefore, they do not necessarily reflect the frequency of occurrence of any observations made in a numerical sense. Given Caplin's knowledge of the sample repertoire, it is surprising that he does not quantify the data he collects. Instead, he makes use of numerous adverbs such as 'mostly', 'rarely' and 'commonly'. '"Frequently" tells us that [an aspect] is common, while "sometimes" and "on occasion" indicate a modest size within the total number; but this leaves us with the queasy sense that a majority of instances have been left unaccounted for' (Grave, 1998, p. 2). An example of this description can be found in Caplin's study of the coda. As Grave states:

> we read that 'frequently… the composer adds a *coda*' (p. 179), that 'sometimes the notation indicates that the coda starts after the double bar lines that instruct the performer to repeat the development and recapitulation together' (p. 181), and that 'on occasion, a genuine coda is included in the repeat of the development and recapitulation' (p. 278, note 8)… True, we can infer a relatively large number of codas in

movements where there are no repeat signs for the latter part of the movement, but this subcategory is never identified as such (1998, p. 2).

In exploring large quantities of varying repertoire by three different composers, Caplin reduces all of these works to the same standard, expecting, for example, the coda to be organised and function in the same format for a sonata-form first movement of a string quartet, as it would for a theme-and-variation final movement in a symphony. In reality, this is not the case and, depending on which proportion of the sample is included in the published study, will determine the observations made and, subsequently, the theories and definitions created. Furthermore, not quantifying the observations made means that Caplin's approach, and large-scale approaches like it, are in danger of creating theories and definitions which apply to a majority of movements, but where the exceptions may be also just as numerous. Interestingly, this issue could explain the contradictory nature of the definitions found in Section 1.2.1 (p. 26).

Charles Rosen (1988) Sonata Forms

Similar to Caplin, Rosen focuses his studies around the works of Haydn, Mozart and Beethoven. However, his exploration of sonata form, which does provide individual chapters on the exposition, development, recapitulation and coda (whilst overlooking the introduction section), focuses on a smaller, select number of works and movements. In his chapter on the coda, Rosen only covers a small number of Haydn string quartets (1988, pp. 297–314), 'the grandest of [Haydn's] symphonic codas… the last movement of No. 98 and the first movement of No. 102' (1988, p. 314), a number of Mozart chamber works including the first movement of the 'Hunt' Quartet in Bb, K. 458 (1988, pp. 314–315), the 'Jupiter' Symphony, K. 551 (1988, p. 324), and one of the most proportionally anomalous symphonies, the fourth movement of Beethoven's Symphony No. 8. By focusing on this small repertoire sample

Rosen is able to explore in detail, the codas in these movements. However, Rosen does not provide a generalised definition or any theories regarding the coda.

Smyth states that 'Rosen sees no compelling reason to present a rigorous definition of the coda – just as he argues against framing a cast-iron definition of sonata form' (1985, p. 32). However, it is possible that Rosen does not provide a rigorous definition of the coda, because his approach does not allow for such a creation. Regardless of this, Rosen's observations have been, and are, used to define the coda. Unfortunately, we do not know, without expanding the sample size, whether or not the movements listed above contain codas which accurately represent the wider sample of movements by Haydn, Mozart and Beethoven. A definition based on such a small sample could be more damaging to our understanding of the coda than illuminating, creating theories and definitions which conflict with those made based on more conforming examples. However, again, without establishing a general theory there is no baseline with which to compare Rosen's sample. An example of this can be found in Rosen's discussion of the tonic-saturation function of the coda in the first movement of Beethoven's Symphony No. 3.

Rosen identifies that once the coda from the first movement of Beethoven's Symphony No. 3 has commenced and the 'juxtaposing powerfully spaced and orchestrated chords of D-flat Major and C Major' have sounded, the music has briefly moved 'through a series of keys of basically subdominant character, the relative minor in particular' the music arrives at 'one of the longest tonic cadences ever written, pages of nothing but V-I repeated over and over' (2005, p. 394). Although this elongated tonic cadence is a valid point and clearly important to the coda in the movement, as Rosen suggests, to balance the harmonic tensions of the development (2005, p. 394), his discussions do not identify how common this format appears in the codas of Haydn, Mozart and Beethoven. Do all the codas by the sample composers contain passages of tonic cadences? Is the passage of tonic cadences significantly longer in this movement than others by the three composers? What proportion of movements by Haydn, Mozart and Beethoven contain codas with passages of tonic cadences of this length? And are longer passages of tonic cadences located in all genres or are they specific to codas in symphonies? Unless research of the coda engages with a larger sample, questions such as these cannot be answered and definitions and theories cannot be created. Subsequently, without a foundation definition, the conformity of examples, such as the coda from the first movement of Beethoven's Symphony No. 3, to the definition cannot be discussed.

Joseph Kerman (1985) Notes on Beethoven's Codas

If Caplin's and Rosen's approaches are to be seen as opposite extremes, based on the size of their samples and methodology, then Kerman's approach sits in between the two. Kerman, unlike Caplin and Rosen (who incorporate the works of Mozart, Haydn and Beethoven in their studies), engages with only one composer. This approach allows for a more focused study and increases the chances of creating generalisations applicable to the whole selected sample. However, given the more focused approach of Kerman's study, the sample size, which includes movements from Symphony No. 1, String Quartet Op. 29 Trio Op. 70, Cello Sonata Op. 69, and Piano Concerto No. 1, is still too large to investigate and draw any significant conclusions, especially considering the space constraints. Partly as a result of this, Kerman's chapter tends to approach the investigation of the coda in a similar method to Rosen. He focuses on a number of chosen works spending a large proportion of the latter half of the chapter discussing the coda of Beethoven's Symphony No. 8, having clearly identified it as an exceptional example.

Unfortunately, like Rosen, Kerman does not provide a clear definition of a coda and, as a result, it is difficult for the reader to identify what makes the coda from the fourth movement of Beethoven's Symphony No. 8 worthy of detailed analysis and discussion, other than its exceptional length. It would appear that the issue of an over-sized sample, which affected

Caplin's and Rosen's study of the coda, also affects Kerman. Even by focusing on one composer, the variety of genres included does not appear to allow for the creation of generalised theories and definitions of the coda.

Esther Cavett-Dunsby (1988) Mozart's Codas

Perhaps the best example of approaching the investigation of the sonata-form coda can be found in Cavett-Dunsby (1988). Like Kerman, Cavett-Dunsby focuses her study of the coda on one composer. However, unlike Kerman, Cavett-Dunsby further reduces her sample to 88 chamber and piano works. These include string quartets, duos and trios for strings and wind, quartets and quintets with piano, and piano sonatas.

This list is reduced further by only including works which contain what Cavett-Dunsby labels as 'formal codas'. A 'formal coda' is a coda, taken from a sonata-form movement, which begins after the double barlines and repeat marks towards the end of the movement (Cavett-Dunsby, 1988, p. 32). By focusing her investigation on the identified 'formal codas' only, Cavett-Dunsby's sample is reduced further to 25 movements (19 first movements and 6 finales). By focusing on pre-identified codas, Cavett-Dunsby is able to avoid becoming detained in a discussion of identifying what constitutes a coda, which works contain them and where they begin. However, the disadvantage of just focusing on 'formal codas' is that Cavett-Dunsby avoids dealing with a large portion of movements which do contain a coda, but that are not clearly identifiable through the presence of double barlines and repeat marks. In the case of Mozart's symphonic first and final movements, and based on the theoretical methodology for identifying the coda used in this thesis (Chapter Three), there are a total of 32 movements which contain a coda section. However, if only movements with 'formal codas' are counted then the number of movements containing a coda falls to 12. Thus Cavett-Dunsby's approach omits approximately 60% of the movements containing a coda.

This reduction is not necessarily by choice, but is in fact a result of Cavett-Dunsby's inability to identify any other form of coda. This highlights an important issue with current coda studies – the absent or ineffective methodologies for identifying a coda. As Cavett-Dunsby states, 'given that there is no consistent theoretical approach to finding a coda, this article will take as its point of departure the authority of Mozart's actual notation' (1988, p. 32). Interestingly, what this example highlights, and perhaps what Cavett-Dunsby hints at in her article (p. 32), is that 'formal codas' are only *one specific type of coda* and that although there are a number of 'formal codas' which can be clearly identified, there are a number of codas which are more closely integrated into the recapitulation. It is these types of codas which will require new or refined methods for their identification. Creating a methodology which is applicable for the identification of the coda in the thesis sample is the focus of Chapter Three.

1.3 Statement of the Problem

In his chapter on Beethoven's codas, Kerman identifies that 'musical analysts who deal with Beethoven's sonata-form movements generally do rather poorly by the codas' (1982, p. 141). He suggests that this failure to engage with the sonata-form coda is partly explained 'by the inadequacy of theorists in this area' (1982, p. 141). Theorists disregard the coda, appearing happy enough to label and describe the section as 'coda' or simply mention the section in passing as a footnote.

Although a number of theorists have actively engaged with the coda in more recent theoretical studies, examination of the coda in theoretical literature is still widely neglected. Hepokoski and Darcy's section on the coda, which represents the coda in 'sonatas, symphonies, and chamber music of the "early classical" and "classical" period' (2006, p. v), is still only ten pages long, 6% of the size of the material on the exposition and constituting only 2%

of the whole work. Clearly the quantity of definitions for the sonata-form coda does not match that for the exposition, development and recapitulation.

Not only is the coda widely neglected in theoretical studies, but, as identified in Section 1.2 (p. 26), the definitions and theories currently used to understand and explain this section are vague, uninformative and conflicting. Alarmingly, as evident in Cavett-Dunsby (1988), until a methodology is created for identifying the presence and start of a coda section, studies are unable to engage with the full range of codas present in sonata-form movements. How can we study the coda when we are unable to identify it in all its different forms?

Unfortunately, if the current level of neglect continues, our understanding of the coda and subsequently sonata-form will remain incomplete, and the numerous vague and contradictory definitions will continue to prevail. How can we hope to understand sonata form when we actively ignore a substantial section? Only by taking the study of the coda to the same level as the rest of sonata form, will it be possible to develop an understanding which respects all parts of sonata form and does not overlook problematic (or optional) elements. By exploring the coda in the same level of detail as the exposition, development and recapitulation, we may also gain new insight into how these sections are organised and how they relate to the closure of the movement.

Finally, not only is a study of the coda important for developing our understanding of the sonata form, but the coda is a structural section present in numerous forms and genres throughout music history, appearing in large amounts of music well beyond eighteenth-century form, including twentieth-century contemporary and popular music. Although this thesis may not provide a definition for the coda applicable to every form and genre, it will provide a starting point from which to develop our understanding and an adaptable methodology to apply to other works.

1.4 Resolution

1.4.1 Research Aims

The research aims of the thesis are:

- to provide a theoretical model that describes the organisation of the coda both as an autonomous entity and as a part of a larger form,
- to develop an approach able to engage with large samples of musical material in order to draw observations and conclusions relevant to the whole sample rather than isolated examples.

1.4.2 Research Questions

To address the issues highlighted and discussed in this Chapter, and provide a new and informative view on the coda, this thesis will answer the following core research question: *How is the coda organised and how does it relate to the movement as a whole?* In order to address this core research question, the following related sub-questions will be explored and answered:

- How does one identify whether or not a movement contains a coda and where that coda begins?
- How was closure achieved, historically, before the introduction of a coda in symphonic first and final sonata-form movements?
- What are the different types of recapitulation-coda parataxis?
- How do Haydn, Mozart and Beethoven treat the coda differently in their works and how does it change over time?

1.4.3 Overview

In order to answer the research questions posed above, this thesis will look at the coda in a focused sonata-form sample. Any attempt to describe and detail the coda in the entire history of Western Classical music would encompass examining enormous quantities of music from codas in canons and fugues, to codas in variations and sonata form; from codas in solo instrumental works to string quartets and large-orchestral music; from its usage in thirteenth century music as a melismatic interlude, to its use in the classical symphony and continued use in contemporary music. A study of the coda in all of these different genres would be impossibly long, beyond the scope of this investigation, and would undoubtedly lead to the formation of vague, uninformative generalisations. As a result, this thesis proposes a study which focuses on the coda in the symphonic sonata-form first and final movements by Haydn, Mozart and Beethoven. By constraining the focus of the study, the observations and results presented do not become so vague that they do not provide a meaningful insight into the structure or function of the coda, but neither do they become so work-specific that they are an inaccurate reflection of the genre from which they have been selected. The sample selected and the criteria for its selection will be discussed in Section 2.1.

With the sample established, each of the codas included will be analysed and data collected for a variety of musical parameters. This will encompass data regarding the structure, tonality, harmony, thematic material, instrumentation and orchestration (Section 2.4). However, before this data can be collected, and in order to answer the first research question, a methodology will need to be constructed which allows for the identification of the coda in a movement and its starting point. This is a fundamental step in the exploration of the coda and one which has hampered attempts by previous music theorists such as Cavett-Dunsby (1988). Eight criteria are identified in Chapter Three which, when combined, can be used to determine the presence of a coda in a symphonic sonata-form movement by Haydn, Mozart and Beethoven, along with a possible starting bar for the section.

Once the first research question has been addressed, the movements from the sample containing a coda have been identified and the starting bar of each of these sections established, data can be collected regarding the six parameters. In addition, the thesis will be able to engage with the second and third research questions discussing how closure is completed when a coda is not present and how the coda, when present, is connected to the recapitulation. These discussions can be found in Sections 4.2 and 4.3, respectively.

In order to explore the entire sample of codas, establish theories and generalisations regarding this section and address the final two research questions, this thesis will adopt a prototype-statistical and a statistical-correlation methodology. With large data sets to analyse, statistical testing presents a systematic inclusive method for identifying patterns, averages and correlations. Furthermore, with the aid of computational techniques these numerical processes can be carried out 'speedily and accurately' (Pople, 2004, p. 127). Given that, as Pople states, a theoretical study 'studies musical works in order to deduce "more general principles of music structure"' (2004, p. 127), through identifying characteristics common across multiple works, movements and genres, it is logical to adopt an approach which contains methods purposely designed to identify patterns and similarities. Statistics are a flexible set of procedures capable of exploring multiple aspects of both individual and combined musical parameters.

As highlighted in Section 1.2.2 (p. 40), one of the issues with theoretical works on the coda and sonata-form (even with a reduced sample such as Kerman (1982)), is the inability to engage with every work or movement within the whole sample. As a result, theorists often generalise based on a cluster sample (chosen by dividing the population into groups and then randomly selecting a sample from each group to represent the whole population). Carse, for example, does not 'closely examine the enormous amount of material which is in existence';

what information he presents 'is based on a close examination of a number of works picked out here and there from representatives of various nationality, of various schools, from the work of composers both remembered and forgotten' (1936, p. 40). As discussed in Section 1.2 (p. 26), the result of this sampling method is that the observations and conclusions drawn do not necessarily reflect the majority and there could easily be a number of examples from the sample (such as the fourth movements of Mozart's Symphony K. 551 and Haydn's Symphony No. 90), not selected for study, which contradict the theories arrived at.

The term 'prototypical' or 'prototype' has been employed within music theory at various points throughout the history of the field. The prefix 'proto-' can mean 'first in time,' 'original, or 'primitive.' Thus a music theorist might simply use the word 'prototype' in the vernacular sense – as referring to an underlying pattern or average (de Clercq, 2012, p. 17). By adopting a prototype-statistical methodology to the study of the coda, this thesis is able to engage with every movement included in the sample. Using the data collected from every coda and calculating the mean averages (a description of central tendency), it will be possible to identify the average value for each parameter investigated (e.g., the average proportion of tonic harmony in Haydn's, Mozart's and Beethoven's codas). Establishing the prototype data for these composers will allow for the creation of definitions regarding the coda. Further details regarding the calculation of the prototype and the results of the testing applied to the three sample composers can be found in Sections 2.5.1, 5.2, 6.2 and 7.2.

Not only will the prototype (average numerical value) for each parameter investigated be calculated, but the data will also allow for the creation of prototypes which represent the coda parameters in the sample composers' first and final movements, separately. By undertaking this approach, it will be possible to identify whether or not there is a difference between how the sample composers treat the coda in first and final movements (i.e., the average proportion of tonic harmony in Haydn's final-movement codas may be significantly higher than in his first-movement codas). If there is a significant difference between a large number of the parameters in the sample composers' first- and final-movement codas, it could explain why definitions of the coda appear so vague and conflicting. The differences between the three composers' first and final movement prototypes can be found in Sections 5.3, 6.3 and 7.3.

Although the prototype is an extrapolated numerical average which is unlikely to be represented exactly by any of the sample codas, by applying a series of numerical processes (Section 2.5.2), it will be possible to identify how conformant each coda in the sample is with regard to the different prototypes calculated. This process will highlight the most- and least-conformant examples of the prototype definitions calculated in Sections 5.2, 6.2 and 7.2, whilst also identifying the overall spread of the codas with regard to the prototype (i.e., are the majority of the sample codas conformant with the prototype or are there numerous non-conformant examples). By identifying the most-conformant codas this thesis can study these highlighted movements and explore how the calculated prototypes manifest in the coda (i.e., how the identified average proportion of tonic harmony utilised in the coda). In contrast, by identifying the least-conformant codas this thesis can again study these highlighted movements and explore how these non-conformant codas differ from the prototype. The results of this methodology applied to the three sample composers can be found in Sections 5.4, 6.4 and 7.4. Finally, with regard to the prototype-statistical methodology, by amalgamating all the parameter data it will be possible to identify the meta-prototypical coda for each composer sample. The results of these amalgamations can be found in Sections 5.5, 6.5 and 7.5.

In addition to the prototype-statistical methodology, a statistical-correlation test will be applied to the parameters under investigation in order to ascertain whether or not they change significantly across a composer's career (i.e., is the proportion of tonic harmony, on average, in Mozart's later codas the same as in his early codas?). If a large proportion of the parameters do change over time, it could again explain why definitions of the coda appear so vague and conflicting (i.e., a definition based on the movements from the beginning of a composer's career could be very different to a definition based on movements towards the end of composer's career, and hence the contradictory definitions). Further detail regarding this statistical-correlation test and the results of the testing applied to the three sample composers can be found in Sections 2.6, 5.6, 6.6 and 7.6.

With all the data collected regarding the coda in the symphonic first and final movements by Haydn, Mozart and Beethoven, Chapter Eight will provide a summary of the finding in this thesis and present a prototype definition of the coda. Chapter Eight will also outline the further applications of this research.

1.4.4 Chapter Guide

Chapter 1 – Introduction: Discussion of the issues related to the study of the coda, and the previous approaches to its investigation. Presentation of research questions, thesis overview and chapter guide.

Chapter 2 – Methodology: Identification of the research sample and the data collected regarding the six parameters studied. Presentation of the methodology adopted in this thesis with guides explaining how to identify the prototype (average) coda, the most- and least-conformant codas, and significant changes over time.

Chapter 3 – Identifying a Coda: Presentation and application of eight criteria used to identify the presence and beginning of a coda in the sample sonata-form movements.

Chapter 4 – Movement Closure: Identification of the four methods of creating closure in the sample and the examination of how Haydn, Mozart and Beethoven initiate the coda at the end of the recapitulation.

Chapter 5 – The Coda in Haydn's First and Final Symphonic Movements: Investigation into the organisation and function of the coda in Haydn's first and final symphonic movements. Identification of the prototype (average) coda for the parameters explored. Comparison of the prototype data calculated for Haydn’s first and final movements. Identification and comparison of the most- and least-conformant coda for each of the parameters studied in isolation and in combination. Identification of any significant parameters changes in Haydn’s codas over time.

Chapter 6 – The Coda in Mozart’s First and Final Symphonic Movements: Investigation into the organisation and function of the coda in Mozart’s first and final symphonic movements. Identification of the prototype (average) coda for the parameters explored. Comparison of the prototype data calculated for Mozart’s first and final movements. Identification and comparison of the most- and least-conformant coda for each of the parameters studied in isolation and in combination. Identification of any significant parameters changes in Mozart’s codas over time.

Chapter 7 – The Coda in Beethoven’s First and Final Symphonic Movements: Investigation into the organisation and function of the coda in Beethoven’s first and final symphonic movements. Identification of the prototype (average) coda for the parameters explored. Comparison of the prototype data calculated for Beethoven’s first and final movements. Identification and comparison of the most- and least-conformant coda for each of the parameters studied in isolation and in combination. Identification of any significant parameters changes in Beethoven’s codas over time.

Chapter 8 – Conclusion: Summary of findings and a cross-comparison of the prototype data and the most- and least-conformant codas for Haydn, Mozart and Beethoven. Conclusions on the contributions to knowledge made in this thesis. Analysis of the limitations of this research and suggestions for future research.

1.5 Summary

This thesis addresses an area of sonata-form theory which has suffered neglect in previous studies. The work proposes a systematic-empirical study of the coda which engages with all works in the selected sample. Unlike previous studies, where the definitions provided are hedged by words which do not suggest a definite or assertive expression of opinion, this thesis will formalise the observations and principles proposed. The choice of limiting the scope of the investigation to the sonata-form coda in the first and final movements of Haydn's, Mozart's and Beethoven's symphonies is a result of the failings of previous studies to identify common patterns and create universal generalisations for the coda in large samples which incorporate works from multiple different forms and genres. A key assumption for this thesis is that previous studies have failed to engage successfully with the sonata-form coda owing to the choice of sample, the sample size and the methodologies applied. Without a focused study on the coda, the vague definitions and generalisations discussed in this chapter will continue to circulate in theoretical studies and our understanding of the coda and sonata-form movements which contain codas will remain incomplete.

Chapter Two outlines, in greater detail the fresh approach adopted in this thesis. It discusses:

- the reasons for the sample selected,
- the data collection methodology,
- the processes used to:
    - calculate the prototype (average) coda,
    - identify the most- and least-conformant codas,
    - establish whether or not any of parameters investigated change over time.

Chapter Two – Methodology

2.1 Identifying a Sample

From discussions of the coda in Chapter One (Section 1.2, p. 26), it is clear that not only is the coda a structural section present in numerous music genres, but the descriptions created to explain the structure and function of this section are vague and often inapplicable to a large proportion of works. To avoid replicating these conclusions in this study, this thesis will focus on the coda in relation to the symphonic first and final sonata-allegro and sonata-rondo movements by Haydn, Mozart and Beethoven. No effort will be made to engage with composers, forms, genres or movements beyond the outlined approach, although they may be referenced in order to support a claim or theory. The approach outlined in this chapter finds common ground between the theoretical approaches discussed previously, and in fact, none of the sample parameters (i.e., composer, genre, work, movement) included in this study are new to the investigation of the coda. Caplin (1998), for example, includes the works of Haydn, Mozart and Beethoven, discusses the coda in some of these composers' symphonic first and final movements, and investigates the coda with regard to sonata-allegro and sonata-rondo form, amongst others.

By focusing the study on this sample, the observations and results presented will avoid becoming so vague that they fail to provide a true insight into the organisation or function of the coda. Nor will they become too work-specific that they are an unfair reflection of the genre from which they have been selected. This focused approach does not diminish the output or worth of the study and, in fact, like Cavett-Dunsby's approach (1988), by constraining the sample under study it allows for the identification and creation of more specific observations and conclusions. Furthermore, the results of this study are intended to act as a foundation for further investigation of the coda. As Bonds suggests, 'one of the most serious shortcomings of recent theories of Classical sonata form is the lack of a conceptual basis of form that can be applied to other structural stereotypes' (2010, p. 10). By applying the methodologies of this study to other 'structural stereotypes', it should be possible to expand current understanding of the coda and, through comparing the results, to identify the attributes from this study which are universal to the coda in other forms and genres and those which are relevant only to the sample studied in this investigation.

2.1.1 The Symphony

One study cannot examine every type of composition and every type of movement. Haimo suggests that 'different genres have slightly different normative expectations'. For example 'the range of acceptable sizes of the development section… the amount of acceptable (non-redundant) repetition… and the length of phrases' (Haimo, 1995, p. 269). As a result, any observations made 'will be more reliable the more carefully they are grounded in the expectations and norms of a… specific genre' (1995, p. 270).

'Few [public] genres of the last 250 years have proved so crucial to the course of music history, or so vital to… musical experience, as the symphony' (Horton, 2013, p. i). As a public genre demonstrating composers' compositional skills, coupled with the numerous opportunities for development and experimentation through the wide range of instrumental sonorities, the symphony was an important and fast-developing genre in the eighteenth and nineteenth centuries. As Carse states, 'at the end of the seventeenth century the concert-symphony, as we now understand that term, was unknown; at the end of the eighteenth it was the most important form of purely orchestral music, and a moderate estimate is that considerably more than 1,500 such works had been written' (1936, p. 39). Given that the increase in the number of symphonies composed in the late-eighteenth and early-nineteenth centuries coincides with the period in which current studies (Smyth, 1985) would suggest that the sonata-form coda was introduced and developed, the symphony provides a perfect vehicle and an excellent resource for exploring the sonata-form coda.

Up until the end of the twentieth century, studies of sonata form have focused heavily on small ensemble or solo genres, with only a number of references to symphonic large ensemble works. For example, Marx, in his exploration of sonata form, spends over a hundred pages focusing mainly on Beethoven's piano sonatas (Marx & Burnham, 1997, p. 91). Furthermore, not only have studies focused on sonata form in small ensembles and solo genres, but references to, and studies of sonata form in the symphony are often made with regard to works which do not in fact represent the norms of the genre. Kerman (1982) explores the organisation of the coda using the fourth movement of Beethoven's Symphony no. 8 as an example. However, just the sheer size of this coda section indicates the unsuitability of this movement as a representative of the standard norms for sonata form in the symphonic genre. Given the quantity of literature written regarding the symphony, in particular the works of Haydn, Mozart and Beethoven, and the musical value of these three composers' outputs, there is no reason, other than the physical size of the individual works, for not engaging with this genre as a sample in which to study the sonata-form coda.

Not only do the symphonies of Haydn, Mozart and Beethoven provide a manageable and workable sample in which to investigate the coda (Section 2.1.4), but by investigating large ensemble music, the study can engage with secondary parameters such as instrumentation, orchestration and texture. These parameters do not only aid in achieving climax and furthering resolution in sonata form but, as will be discussed in Chapter Three, are important and effective means for identifying the start of the coda. Given that these parameters are less applicable to certain genres, without studying a sample of large-ensemble sonata-form movements, such as the symphony, it will not be possible to make these secondary-parameter observations.

The sample of symphonies included by Haydn, Mozart and Beethoven in this study is taken from the work lists by Feder and Webster (2001), Eisen and Sadie (2001), and Drabkin, Kerman and Tyson (2001), respectively. Given the close connection between the serenade and the symphony in the works of Mozart, for example ‘Mozart’s redaction of K204 as a four-movement symphony’ (Unverricht and Eisen, 2001), a number of serenades are included in the symphonic list. For the purpose of this thesis, if the work is included in the symphony list by Eisen and Sadie, it is included in the study.

2.1.2 First and Final Movements

With a study of this magnitude, it is important to establish a sample size which is manageable and produces observations and results which are reliable and a true reflection of the genre from which they are gathered. Haimo highlights the importance of reducing a study’s focus to a specific form or genre, but he also points out the need for a reduction and focus on certain movements within the selected genre. Not only do ‘different genres have slightly different normative expectations’ but there will also be ‘distinctions between types of movements – between quick first movements, slow internal movements, menuets, and finales’ (Haimo, 1995, p. 270).

The decision to focus the investigation on the first and final movements relates to the number of these movements in sonata-allegro or sonata-rondo form, and the inevitable function of the coda. If the primary purpose of a coda is to bring a movement or work to a close, the most substantial and greatest number of codas should be found in the final movements of the symphonic sample. Skilton suggests, that ‘in the [final] movement the composer summons all his resources for a powerful, compelling close to his work’ (1901, p. 213); and Anson-Cartwright proposes, with regard to Beethoven’s symphonies, that

> every finale is marked, aside from any inherently striking qualities, by virtues of its position within a multi-movement cycle [and therefore] listeners leaving the concert

> hall after a performance often take a stronger impression of the finale than of prior movements… in at least four symphonies – the third, fifth, seventh and ninth – the finale is strongly marked or weighted (2013, p. 185)

In addition, by including the first and final movements in the investigation of the coda, it will be possible to explore the similarities and differences between the organisation and function of the coda in these two movements.

Reducing the investigation to the symphonic first- and final-movement coda sections of Haydn, Mozart and Beethoven provides this study with an initial sample of 333 movements. Given that the coda is not consistently present in sonata-allegro and sonata-rondo form, this initial figure will decrease once the process of identifying the coda is applied (Section 2.3). The sample size is not so large that the generalisations and conclusions become vague and inapplicable to numerous works, but also not so small that identifying any common theories becomes unachievable. If the sample included every movement in the 166 symphonies by Haydn, Mozart and Beethoven, the study would have to engage initially with 628 movements. Engaging with this large number of movements would result in an unmanageable sample. The only solution to this issue would be to focus on just one of the currently selected composers. By doing this, the initial sample would increase or decrease depending on the selected composer (411 movements if Haydn were chosen as the sample composer, 180 movements for Mozart, and 37 movements for Beethoven). This would not make any of the samples unworkable, although the reduction for Beethoven could cause issues, depending on how many of the movements contained coda sections, with applying certain statistical tests owing to the smaller sample size. The issue with this approach, and the criticism (Section 1.2.2, p. 46) made previously with regard to Cavett-Dunsby's (1988) approach, is that by focusing on one composer, it may be possible to identify characteristics with regard to that composer's use of the coda, but it does necessarily allow for any generalisations to be made with regard to the coda of the late-eighteenth and early-nineteenth centuries.

2.1.3 Sonata Allegro and Sonata Rondo

'Any discussion of musical form runs the risk of being overly abstract if it is too general, but of only limited applicability if it is too specific' (Bonds, 2010, p. 10). This thesis aims to avoid these extremes by focusing principally on one large-scale stereotype – sonata form – and by attempting to integrate the analysis of specific sonata-form movements with a broader understanding of musical form in the late-eighteenth and early-nineteenth centuries. As with Bonds' studies, by using sonata form as the sample for studying the coda, this thesis does not suggest that other structural conventions, such as the rondo, minuet, theme and variations, or fugue, are somehow less worthy of consideration. However, sonata form is one of the most important of all instrumental forms of the late-eighteenth and early-nineteenth centuries: it appears in the large majority of first movements in symphonies, sonatas and string quartets, as well as in many slow movements and finales (2010, p. 10). Furthermore, as Caplin argues, 'sonata form continued to exert enormous influence over compositional practice in later musical styles, and remained a viable form, albeit highly modified, at least until the middle of the twentieth century' (1998, p. 195).

It is important that the reader is aware of two points regarding the inclusion of sonata-allegro and sonata-rondo movements in this thesis. Firstly, the term sonata form is used here as a hypernym for both sonata-allegro and sonata-rondo forms. Secondly, although the term 'sonata form' is used to represent both sonata allegro and sonata rondo, they are clearly two different formal types. Given that sonata rondos only appear in the final movements, this means that there are two formal types for the finale in the chosen repertoire.

Ideally, the two types would be treated as two separate categories. As Cole states, an investigation of sonata rondo should not be simply a carbon copy of the methods employed in the study of sonata allegro (1969, p. 180). Treating sonata-allegro and sonata-rondo movements separately would result in two samples, one of which, given its size, would not be suitable for processing using the methodology outlined in this chapter. As a result, if both types were not included, it would not be possible to engage with the sonata-rondo movements in the sample. A possible solution to this issue would be to engage with a large sample of sonata-rondo form codas from specific composers and formal types only, thus ignoring genre. Although this approach would allow for the coda in sonata-rondo movements to be engaged with in insolation (i.e., as a single formal type), the approach would be subject to the same criticisms as those made against Caplin, Rosen and Kerman in Section 1.2.2 (p. 40) (i.e., which works are deemed worthy of inclusion as a representative of the coda in sonata rondo and how is this selection justified?).

Although these two formal types are considered together, the methodology used here will identify the sonata-rondo movement codas as anomalous if they are not similar to the sonata-allegro sample and vice versa. As will be discussed later in this chapter, the codas investigated in this study are compared against a series of averages. If the codas from the sonata-rondo movements are significantly different from the sonata-allegro codas, then the data in Chapters Five, Six and Seven would identify this non-conformity (i.e., the codas least-conformant to the calculated averages would always be identified as a sonata-rondo movement).[6] Results in Chapters Five, Six and Seven identify numerous similarities between the sonata-allegro and sonata-rondo codas with regard to the parameters investigated. The most- and least-conformant examples of the coda can be found in both formal types (e.g., Haydn's most- and least-conformant codas with the structural averages in Section 5.4.1 (p. 220) are located in the finale movements of Symphonies Nos. 88 (SR), 90 (SA), 95 (SA) and 97 (SR)).

[6] None of the sonata-rondo movements by Haydn and Mozart included in this study is the least-conformant meta-prototypical example for either composer (see Table 8.3, p. 374).

Perhaps the most debatable theoretical reason for treating the coda in sonata-allegro and sonata-rondo form differently is the positioning of the final refrain (the last 'A' of ABA-CAB<u>A</u>). Caplin states that, 'unlike a regular sonata [movement], the coda is a required element of sonata-rondo, because that section includes the final return of the main theme' (1998, p.235) (i.e., ABACAB + coda). Not only does this statement change the optional nature of the coda identified in Section 1.2 (p. 26), but it also provides the coda with an essential function (serving simultaneously as the final statement of the refrain). Unfortunately, as will be discussed in Section 3.1.8 (p. 132), Caplin's statement is not applicable to the full sample of sonata-rondo movements in this thesis, nor does it accord with the views of other theorists such as Berry (1985) and Tovey (1956). The latter two suggest that the final refrain is incorporated into the recapitulation and thus the coda is, again, an optional extra (i.e., ABACABA + coda). Czerny's interpretation of sonata-rondo form (in Cole, 1969, p. 187), which should perhaps be given special consideration given his historical proximity to the three sample composers, also views the coda as an additional section following the final refrain. Czerny segregates the sonata rondo into four sections with each beginning with a restatement of the refrain (i.e., AB|AC|AB|A + coda). The final section is further divided into two sections with a statement of the refrain followed by a coda.

In Section 1.2.2 the issue of attempting to create generalisations of the coda based on the codas from numerous different genres and formal types is discussed with regard to the studies of Caplin, Rosen and Kerman. A similar criticism could be made of the decision to combine the two formal types in this study. However, without incorporating them, not only would the methodology be unable to engage with the sonata-rondo movements containing a coda, but it would also require the removal of a number of significant movements (i.e., all but, arguably, three of Haydn's London Symphonies).

Given the focus of this study, a number of movements (such as the fourth movement of Haydn's Symphony no. 72) have not been included in the sample because they do not conform to either sonata-allegro or sonata-rondo form. However, there are also a number of movements which, although identified as conforming to the sonata-allegro or sonata-rondo principles, have sparked debates amongst theorists with regard to their conformity. Identifiable as a sonata-form movement, Haimo remarks that the first movement of Haydn's Symphony no. 18, which begins 'as if it were a concerto for two oboes' (1995, p. 43),

> is worked out in very free form, almost like a fantasie. One could try to consider it a kind of sonata form, but even this does not work particularly well. Although there is a development-like passage approximately in the middle of the [movement] (bars 29–41), and although the opening theme does return after that point in the tonic key (bar 49), the cadences present a serious problem… The harmonic plan also cannot easily be reconciled with the general expectations for sonata forms. Since there has been no extended statement in the dominant key, nothing is subject to the sonata principle; nothing needs to be brought back to the tonic (1995, pp. 43–48).

Similarly, views on the form of the fourth movement of Beethoven's Symphony no. 9 are widely debated. Webster suggests it was Sanders (1964) who first attributed the final movement to sonata form (1992, p. 38). Webster disagrees with Sander's suggestion, stating that he hears the 'finale of the Ninth as through-composed: every section remains incomplete or leads seamlessly to the next in such a way that no large-scale closure take place until the end' (1992, p. 27). Webster goes on to state that 'for this music, concepts like "sonata form" will not do' (1992, p. 61).

In situations such as the first movement of Haydn's Symphony no.18 and the fourth movement of Beethoven's Symphony no. 9, it is not possible to assign a definitive formal label, although clearly a number of musicologists have tried. As Haimo states, 'these movements [are] not only unique, [but] recondite, amorphous. Simply put, [they] do not correspond well to any commonly recognised formal type' (1995, p. 43). The issue with incorporating movements such as these into a study of a subsection of sonata form is that if the movements are not representatives of sonata form, the sections identified as codas will also not be appropriate representatives upon which to construct generalisations. From a statistical standpoint, if they do not conform to the rest of the sample, they may jeopardize the study by expanding the range of anomalous data, which may in turn not only hide statistical outliers, but also change what the investigation deems to be a prototypical symphonic sonata-form coda.[7] Unfortunately, until the forms of these ambiguous movements can be agreed upon or identified, they must, for fear of producing anomalous observations, remain excluded from the sample and treated as individual entities.

2.1.4 Haydn, Mozart and Beethoven

Perhaps the biggest question pertaining to the identification of a sample for the investigation of the coda is the choice of composers. By choosing Haydn, Mozart and Beethoven as a sample it could be argued this thesis has an underlying agenda in that, by using them to construct generalisations regarding the coda, it aims to reinforce their canonical status. It could also be argued that any results and observations made using this sample are atypical of the compositional trends of the late-eighteenth and early-nineteenth centuries and that, ipso facto, the works of Kleinmeister may be more typical. This thesis aims to contribute to the understanding of the Viennese Classical style. If the reader defines Viennese Classicism as exemplified by the works of Haydn, Mozart and Beethoven, this work makes a significant contribution to our understanding of this style. If the reader deems these three composers as outliers of the Viennese Classical style, this thesis makes a contribution to music research which will allow future studies to be undertaken on the coda in the works of the Kleinmeister. Further-

[7] Future studies could use the prototype and correlation methodology applied in this thesis to investigate the plausibility of these structurally ambiguous movements as sonata forms or something other.

more, given that there is very little coda-specific literature currently available, without establishing a foundation of theories to which other works can be compared, it is difficult to identify what is typical and atypical of a late-eighteenth and early-nineteenth century coda.

Although a study of the coda in works by Kleinmeister may yield interesting and perhaps different results from Haydn, Mozart and Beethoven, their works also have a greater association with issues of score availability, authorship and work-dating. The lack of accessible scores is a continuous problem is music research, especially in research which intends to analyse large samples of music. Longyear's study of the minor mode in eighteenth-century sonata form provides a good example of this issue. He is forced to take 'a descriptive-taxonomic rather than statistical approach to his research, since the latter would demand the publication of many more sonata-form movements in minor keys than [was] presently available' (1971, p. 183). At the time of Longyear's article's publication, 'it is doubtful that more than 20% of the symphonies or string quartets in [the] minor [key] listed in the Breitkopf Thematic Catalogue (1762–1787) [were] available in score' (Longyear, 1971, p. 184). This issue of availability transfers to the study of the coda, for without a large sample of works any observations risk becoming too abstract and inconclusive. It is essential in a study of this type, which aims to study a structural section across the entire symphonic output of three composers through numerical methodologies, that the sample is as complete as possible.

The issue of available material is compounded by the issue of assigning authorship. Although there are still some issues of authenticity associated with a number of symphonic works by Haydn and Mozart, less research has been undertaken into the symphonic works of Kleinmeister such as Dittersdorf and Vanhal and, as a result, attributing a total figure to their symphonic output is even more challenging. As Grave and Lane state, 'the authenticity of many works attributed to [Dittersdorf]… has yet been impossible to verify, and the available data must be regarded as provisional. This is especially true in the case of the symphonies' (2001).

A final issue is that of work dating. As Carse states,

> in tracing the growth of the sonata or first-movement in connection with the evolution of the symphony one is constantly faced with the difficulty of establishing the dates of particular works. The working life of a composer may easily cover thirty or forty years, and the estimated date of a work, even though aided by 'Opus' numbers, may possibly be wrong by about ten to twenty years; the error is then serious and misleading in a period when sonata-form was quickly taking shape (1936, p. 45).

The issue that Carse highlights is still pertinent in the present, with the composition dates for more than 41% of the symphonies by Haydn and Mozart still uncertain (Feder, 2017). However, this percentage would be much higher for less canonic composers. For this thesis, dates of works by Haydn, Mozart and Beethoven are taken from Feder and Webster (2001), Eisen and Sadie (2001), and Drabkin, Kerman and Tyson (2001), respectively.

Even if the symphonies of the aforementioned Kleinmeister were available and their authorship verified, adding their collective symphonic output to the sample already under study would enlarge the investigation beyond the scope of this thesis. By adding the first and final movements of these two composers the sample size would increase to approximately 742 movements. By focusing on the symphonies of Haydn, Mozart and Beethoven, the investigation is able to work with a sample which is readily available, easy to access, and, once the movements containing a coda have been identified, suitable in size for the numerical methodologies employed in this study.

Perhaps one of the more obvious practical reasons for choosing Haydn, Mozart and Beethoven as the sample composers for this investigation is their presence in current theoretical studies. Current literature suggests that the codas 'in the works of Haydn, Mozart and Beethoven represent a pinnacle in the development of stylized formal closure in Western art music' (Smyth, 1985, p. 1), and Kerman suggests that Beethoven may be the major developer of the coda, 'expanding the coda greatly, even decisively' (1982, p. 141). Whether or not these views are tainted by the desire to promote the 'greatness' of these composers, or the lack of investigation beyond them, the studies previously completed on the coda with regard to the works of Haydn, Mozart and Beethoven provide a foundation on which to build a more focused and clearer understanding of the coda.

In addition, Marx suggests that

> taken together, all the Haydn symphonies, or all those of Mozart or of Beethoven, offer themselves – no matter how myriad the content, especially in the case of the last named – as recognizable creations of the same architect. And just as certainly, Mozart's symphonies testify to their origin in those of Haydn, while one need only consider the outward form of Beethoven's symphonies to see that they lean upon those of Mozart; association and succession are every bit as unmistakable here as the progress each master makes beyond his predecessors (1997, p. 58).

By combining the works of these three composers in one sample, this investigation may be able to identify 'recognizable creations of the same architect' and explore how they develop across the sample output, whilst also identifying how each of the three composers vary the organisation and function of the coda.

Finally, the decision to base the symphonic sample on Haydn, Mozart and Beethoven is because all three composers were familiar with the 'term' coda. Evidence of this can be found in correspondence from all three composers. In 1783, in a letter addressed to Leopold Mozart regarding a number of suggested alterations to *Die Entführung aus dem Serail*, Mozart makes a reference to the coda, stating that in his opinion, 'the scene should begin with a fine duet, which might answer very well with the same text by a small addition for the coda (Wallace, 1866, p. 197). In 1801, in a letter addressed to George Thompson, ‘an enterprising Edinburgh publisher’ (Landon, 1959, p. xxiv), Haydn writes:

> My esteemed friend! I send you herewith the violin accompaniment to the songs you requested, marked with the numbers 1, 2, 3, 4, 5, 6, 7, 8, and trust that I have hit upon your taste. I have also altered the ritornello of no. 15 and added codas to nos. 2, 9, 24 and 25, as you wished... (Landon, 1959, p. 192).

And, in an 1812 letter addressed to Breitkopf and Härtel, Beethoven enquires as to the publication status of a number of his works:

> If the three songs of Goethe are not yet printed, hurry up with them, I want to give them to Princess Kynsky, one of the prettiest, stoutest, ladies in Vienna; and the *Egmont* songs, why are they not published? If here and there you want a coda stuck on the entr’actes, I can manage it, or else let a Leipzig proof-reader of the Music-Zeitung see to it; they understand such matters about as well as a brick-wall (Kalischer, 1972, p.127).

Interestingly, not only do these correspondences indicate a familiarity with the term ‘coda’ by Haydn, Mozart and Beethoven, but they also show an awareness of the ‘term’ by the wider musical community including publishers and proof-readers.

2.2 Composer, Work and Movement Referencing

This thesis uses the scores from the Philharmonia Haydn symphonies (Landon, H. C. R., 1981a, 1981b, 1981c, 1981d, 1981e, 1981f, 1981g, 1981h, 1981i, 1981j, 1981k, 1981l); the Bärenreiter Mozart symphonies ((Mozart, W; Allroggen, G. 1991a, 1991b), (Mozart, W; Fischer, W. 1991), (Mozart, W; Beck, Hermann. 1997, 2005), (Mozart, W; Landon, R. 2003), (Mozart, W; Mahling, C-H; Schnapp, F. 2005), (Mozart, W; Haußwald, G. 2006), (Mozart, W; Schnapp, F; Somfai, L. 1991)); and the Bärenreiter Beethoven symphonies (Del Mar, J., 1996, 1997a, 1997b, 1997c, 1998a, 1998b, 1999a, 1999b, 2000). With a study of this magnitude and focus, there will be a number of references to works and movements by the three sample composers. To avoid convoluted descriptions and enhance tabular displays of data, works and movements by Haydn, Mozart and Beethoven will be referenced using a shorthand method: Composer Initial/Work number/Movement number. For example, the fourth movement of Mozart's Symphony K. 202 will be referenced as M/202/4. In the case of H/103/4 (the fourth movement of Haydn's Symphony no. 103), where there are two versions of the fourth movement, I have labelled these as H/103/4a and H/103/4b.

Similarly, there are two versions of M/550/1 and M/550/4, distinguished by orchestration. The first versions, identified as M/550/1a and M/550/4a, do not include the clarinet. The second versions, identified as M/550/1b and M/550/4b, do include clarinets. Unlike H/103/4, where the difference between the two versions (an additional passage) affects the structural proportions of the movement, the harmonic and thematic organisation, and the instrumentation and orchestration, the addition of clarinets in the second revised version of M/550/1b and M/550/4b only affects the investigation into the orchestration and instrumentation. As a result, the distinction between these two versions only needs be considered in Sections 6.4.4 and 6.5.

2.3 Identifying the Coda in the Selected Sample

Although the initial sample of movements has been selected, given the wide and varied views on the coda section in sonata form, the next stage of the study requires the creation and application of a methodology which can identify the presence and beginning of a sonata-form coda in a symphonic first and final movement. This is a fundamental step in the exploration of the coda and one which has hampered attempts by previous music theorists to gain a better, more rounded understanding of this section. If this initial approach to the coda is not addressed in sufficient detail, this thesis risks creating theories and generalisations based on unstable foundations, or, as with Cavett-Dunsby's (1988) study of the coda discussed in Section 1.2.2 (p. 46), based on a small sample of codas which are not representative of the whole symphonic output by Haydn, Mozart and Beethoven.

For the purpose of this investigation, eight criteria have been devised which, when used in combination, can be used to determine the presence of a coda in a symphonic sonata-form movement by Haydn, Mozart and Beethoven and a possible starting bar for the section. These eight criteria are based on a number of varying primary and secondary parameters including thematic material, harmony, texture and silence. Furthermore, a number of the criteria included are adapted from the current literature on the coda. Although the methodology for identifying the coda has been designed with the symphonic sample in mind, it is also generic enough that it could be used to identify the coda in other genres and in works by other composers. Once the created methodology has been applied to the sample, the initial collection of identified movements can be filtered, ascertaining those which contain a coda and removing those which do not from the sample. Given the importance of this first stage of investigation, Chapter Three is devoted to the discussion of this methodology and the study of the eight criteria for identifying the coda.

With the criteria for identifying a coda established in Chapter Three, Chapter Four will begin by categorising the initial sample of movements into three groups based on the operation of closure employed. Not only do the criteria discussed in Chapter Three offer a method for identifying the movements in the sample which contain a coda, but the location of starting bars identified by certain criteria also provides insight into how the coda is connected to the end of the recapitulation when the start of the coda 'after double barlines and repeat marks' (Cavett-Dunsby, 1988, p. 32) is not clearly evident. The study of this connection between the recapitulation and the coda, discussed in Chapter Four, will result in the identification of three different types of coda integration.

2.4 Data Collection

With the initial samples sorted into categories based on the operation of closure employed and the varying methods used to integrate the coda into the recapitulation discussed, each of the codas will be analysed and data collected for a variety of musical parameters. To provide as rounded a survey as possible, data will be collected regarding the structure, tonality, harmony, thematic material, instrumentation and orchestration of each coda in the sample.

Although the parameters listed in this chapter cover a large number of traits relevant to the organisation of the coda, they cannot cover every aspect. Clearly, there are a number of further parameters which could be explored, including tessitura, tempo, rhythm and texture. However, to include all of these additional parameters and their relative sub-parameters would expand the study beyond its available scope. Although this does not diminish the study or its conclusions, the reader must be aware that the statistical data and the conclusions drawn from them are reflective of the parameters investigated. It is therefore possible that the statistics could yield counterintuitive results. For example, a coda could be identified as a 'prototypical' (see p. 84) example based on the parameters studied, but in fact be 'non-prototypical' with regard to a parameter not studied, or indeed with regard to a listener's phenomenological experience of the music. This does not diminish the findings of this study. The observations and conclusions presented are still accurate in terms of the individual parameters studied and, as Section 1.2.2 (p. 40) identified, without this methodology our understanding of the coda might still be limited to vague and uninformative definitions.

The approach used in this thesis aligns with La Rue's (2011) work on style analysis, which engages with a number of similar questions including:

> What are the distinctive traits of a particular composition, and what makes it hold together (or not)? What are the defining properties of its composer's idiom, and how does that idiom relate to the musical customs of the historical period to which it is

connected? What materials are at the composer's disposal, and how are they deployed? And, in what ways can the composer's accomplishment be appraised by performers, listeners, or critics of musical style? (in Grave, 2014, p. 1).

La Rue engages with a number of musical parameters. However, whereas this thesis combines several parameters under four headings (structure, harmony, thematic material and orchestration/instrumentation), analysing them using a statistical-prototypical methodology, La Rue's method combines several parameters under five headings (sound, harmony, melody, rhythm and growth (the latter generally understood in analytical discourse as form)). Regardless of the differing analytical methodologies, the approaches taken in this thesis and La Rue's (2011) work both aim to 'impose order on large quantities of analytical data' (Grave, 2014, p. 4) in order to answer a number of similar questions and gain a greater understanding of musical style.

By collecting this data, it will be possible to calculate the prototype (the numerical average) for each of the parameters investigated, and subsequently the numerical difference of each individual coda parameter from the average. The following subsections detail the data collected.

2.4.1 Structural Data Collection

The raw and relative lengths of the five structural sections of the movement (introduction, exposition, development, recapitulation and coda) will be recorded. This data is then processed to reflect the presence of repeated sections (exposition and development-recapitulation) in the movement. If this data is not recorded, a coda belonging to a work containing exposition and development-recapitulation repeats, such as M/202/4 , may appear to be proportionally larger than a movement without repeats. However, when taking into the account repeated sections, the coda section may ipso facto be proportionally smaller in size than a movement not containing repeated sections. For example, in M/202/4, if the repeats are not included, the coda is 6% of the whole movement, which is similar in size to the coda from B/4/1. However, if the repeats of the exposition and development-recapitulation are included, the coda is only 3% of the movement and thus proportionally half the size of that from B/4/1. In addition to this data, the structural parameter also encompasses the criteria data collected from Chapter Three (i.e., the number of criteria used to identify the start of the coda).

2.4.2 Harmonic Data Collection

Harmonic analysis of the sample codas will involve identifying the chords used in each bar of the coda with relation to the home key and the percentage of each chord-type used throughout the coda (tonic, dominant, flattened submediant, diminished seventh, etc.). In addition to this, data will be collected regarding the level of chord diversity, the harmonic rhythm, and the gradient of chord progression.

Chord Diversity

The level of chord diversity reflects the number of different chord-types used in the coda. For example, a coda which contains tonic, supertonic, subdominant and dominant chords would receive a chord diversity value of four.

Harmonic Rhythm

The harmonic rhythm is calculated by identifying the number of chord changes in the coda and dividing that number by the total length of the section. The larger the figure produced by this calculation, the greater the rate of harmonic change in the coda (i.e., a coda with a harmonic rhythm of one chord per bar will receive a score of one, whereas a coda which contains an increased rate of harmonic change will receive a score greater than one and a coda which contains fewer chord changes will receive a score less than one).

Harmonic Gradient

The gradient of the chord progression reflects the order in which the selected chords are used throughout the coda. A gradient can be located between the range of +1 and -1. The figure for this is calculated by plotting the chord data and calculating the gradient of the line of best fit. The gradient data for each individual coda does not provide any insight beyond re-inforcing the generalisation that *the coda ends on the tonic*. Its addition to this stage of the data collection methodology is to provide a numerical value representative of the chord progression used in the coda. By comparing this value against the rest of the sample and the prototype, the gradient figure will provide some insight into the coda. Firstly, by identifying the coda closest to the gradient prototype, it will be possible to establish a prototypical chord progression. Secondly, by comparing the data collected it will be possible to group codas with similar gradients and similar chord progressions.

2.4.3 Thematic Data Collection

The collection and study of data for the thematic material present in the codas is possibly the most subjective of all the data collected in this thesis, because it relies primarily on the analyst's ability to identify thematic patterns between material from the introduction, exposition and development and the coda. Thematic material in the coda taken from the introduction, exposition and development will be associated with one of eleven categories and the proportional length of this material, with regard to the coda, will be recorded. Table 2.1 outlines the thematic categories and provides examples of passages associated with each thematic category located in the sample codas. As with the composer-work-movement abbreviation (Section 2.2, p. 70), the thematic material terms will also be abbreviated to avoid convoluted descriptions in future chapters.

Table 2.1 – Categories for thematic analysis of the coda

Thematic Category	Abbr.	Example
Material from the introduction	IM	H/103/1 bb. 201–212
Material from the expositional first subject	EFS	M/184/3 bb. 203–210
Expansion or variation of material from the expositional first subject		B/1/1 bb. 259–270
Material from the expositional transition	ETS	M/201/4 bb. 174–179
Expansion or variation of material from the expositional transition		B/7/4 bb. 358–404
Material from the expositional second subject	ESS	M/88/4 bb. 195–202
Expansion or variation of material from the expositional second subject		M/199/3 bb. 290–299
Material from the expositional closing section	ECM	H/25/3 bb. 108–111
Expansion or variation of material from the expositional closing section		B/6/5 bb. 219–236
Material from the development section	DM	M/182/1 bb. 131–136
Expansion or variation of material from the development section		H/101/1 bb. 314–322
Material from a different movement	DMM	H/46/4 bb. 153–181

In addition to associating the thematic material of the coda with thematic material in the movement, an additional four categories are used which represent material or passages originating in the coda. These passages are secondary in use to the thematic categories listed above (i.e., a passage of the coda which contains ECM, which in turn contains cadential material (CM), is labelled as ECM). Table 2.2 outlines the four additional categories with a brief description, the abbreviation and example.

Table 2.2 – Additional categories for thematic analysis of the coda

Thematic Category	Abbr.	Description	Example
Cadential Material	CM	A perfect, imperfect or interrupted cadence in isolation or repetition.	H/90/1 bb. 222–227
Tonic Material	TM	Passages of tonic harmony material primarily based on arpeggios or restatements of the tonic chord.	M/161/3 bb. 154–159
Link Passage	LP	A short two to four bar passage linking two passages of thematic restatement in the coda.	M/183/4 bb. 189–190
Silence		One or more bars of orchestral *tutti* silence.	B/4/4 bb. 342 and 344

As well as identifying and categorising the thematic material used in the sample codas, data will also be collected regarding the thematic diversity of the coda and the percentage of thematic repetition.

Thematic Diversity

The level of thematic diversity reflects the number of different themes used in the coda. For example, a coda which contains EFS, ECM and TM would receive a thematic diversity value of three.

Thematic Repetition

The percentage of thematic repetition reflects the proportion of thematic material repeated in the coda section. For example, a coda which begins with four bars of ECM, followed by eight bars of EFS, before ending with the same four bars of ECM would have a thematic repetition value of 25%.

2.4.4 Orchestration and Instrumentation Data Collection

Data will be collected which represent the deployment of each instrument in every bar of the coda. The methodology applied to collect this data is similar to that employed in the collection of instrumentation data in Crackle's previous study (2014). Each bar for every instrument in the coda is labelled as either sounding (1) or silent (0). Table 2.3 and Figure 2.1 provide an example of this methodology applied to H/17/3. Table 2.3 provides the instrumentation and orchestration analysis of the coda from H/17/3 (bb. 67–92). The score of H/17/3 (Figure 2.1) is included for the reader's reference.

Table 2.3 – Data collection methodology used to record the use of instrumentation and orchestration in the coda of H/17/3 (bb. 67–92).

Bar	Instrument								Orchestration Percentage (%)
	Oboe	Bassoon	Horn	First Violin	Second Violin	Viola	Cello	Double Bass	
67	1	1	0	1	1	1	1	1	88
68	1	1	1	1	1	1	1	1	100
69	1	1	0	1	1	1	1	1	88
70	1	1	1	1	1	1	1	1	100
71	0	1	0	1	1	1	1	1	75
72	0	1	0	1	1	1	1	1	75
73	0	1	0	1	1	1	1	1	75
74	0	1	0	1	1	1	1	1	75
75	0	1	0	1	1	1	1	1	75
76	1	1	0	1	1	1	1	1	88
77	1	1	1	1	1	1	1	1	100
78	1	1	1	1	1	1	1	1	100
79	1	1	0	1	1	1	1	1	88
80	1	1	0	1	1	1	1	1	88
81	1	1	1	1	1	1	1	1	100
82	1	1	1	1	1	1	1	1	100
83	0	1	0	1	1	1	1	1	75
84	0	1	0	1	1	1	1	1	75
85	0	1	0	1	1	1	1	1	75
86	1	1	1	1	1	1	1	1	100
87	1	1	1	1	1	1	1	1	100
88	1	1	1	1	1	1	1	1	100
89	1	1	1	1	1	1	1	1	100
90	1	1	1	1	1	1	1	1	100
91	1	1	1	1	1	1	1	1	100
92	1	1	1	1	1	1	1	1	100

Figure 2.1 – Score reference for Table 2.3


81


87
ff
ff
ff
ff
ff
ff

Using this data collection methodology, this investigation can calculate the total percentage orchestration for the coda, the percentage of each instrument in the coda and the orchestration gradient.

Total Percentage Orchestration

The total percentage orchestration represents the average number of instruments used in each bar of the coda. This figure is calculated by firstly calculating the orchestration percentage for each bar (i.e., the total number of instruments present in each bar divided by the total possible number). These figures are displayed in the far right column of Table 2.3. With these figures attained, the total percentage orchestration is calculated by summing the orchestration percentages for each bar and dividing them by the total number of bars in the coda. In the example of H/17/3, the total percentage orchestration equals 90% (i.e., on average, 90% of the forces used for H/17/3 are sounding throughout the coda).

Instrument Percentage

The instrument percentages represent how often each instrument is sounding in the coda. Each instrument percentage is calculated by summing the number of bars the instrument is sounding and dividing that figure by the length of the coda. For example, in H/17/3, the oboe is sounding in 69% of the coda, whilst the entire string section is sounding throughout.

Orchestration Gradient

The orchestration gradient represents the changing orchestration percentage throughout the coda. The orchestration gradient is calculated by plotting the orchestration percentages for each bar and calculating the gradient of the line of best fit. Generally, a positive gradient will suggest an increasing orchestration throughout the coda, whilst a negative gradient will suggest a decreasing orchestration. As with the harmonic gradient, by identifying the coda closest to the gradient prototype, it will be possible to establish a prototypical orchestration for the sample, and, by comparing the data collected, it will be possible to group codas with similar gradients and similar orchestrations.

2.4.5 Data Presentation

The parameter data for the 111 codas present in the sample is too large to be incorporated in this chapter. The relative data is provided in tabular form in the Appendix (p. 383).

2.5 Prototype and Prototypical Coda

When the data collection is completed for the sample of codas under investigation, the study will then focus on establishing a prototype coda and identifying the prototypical codas for each of the parameters studied in the three composer samples. The prototype coda is a numerical construction which refers to the average value for the parameter under investigation. Section 2.5.1 describes how the prototype data is calculated.

The prototypical coda refers to the coda, from the sample, which is the most conformant with the prototype data (i.e., the best example, from the sample, of the average data). Given that the methodology for calculating the prototypical codas has been created purposely for this investigation (i.e., there is no reference for this methodology), it is outlined in Section 2.5.2. Not only will this methodology identify the prototypical codas for the numerous parameters investigated in the works of Haydn, Mozart and Beethoven (Sections 5.4, 6.4 and 7.4, respectively), but it will also identify the meta-prototypical codas (the combination of the data from all the parameters) for Haydn, Mozart and Beethoven in Sections 5.5, 6.5 and 7.5, respectively.

2.5.1 Calculating the Prototype (Average) Coda

To calculate the prototype coda for each composer, the mean average (a description of central tendency), will be calculated for each parameter investigated (i.e., the proportional length of the coda, the percentage of tonic chords in the coda, the percentage of EFS and the total orchestration percentage, etc.). These calculated mean values represent the prototype coda. Sections 5.2, 6.2 and 7.2, will detail the prototype codas with regard to Haydn, Mozart and Beethoven, respectively.

2.5.2 Calculating the Prototypical Codas

Once the prototype codas have been identified, the deviation from the prototype for each individual coda in the sample can then be calculated. Figure 2.2 provides a working method of how the deviation of each individual coda from the prototypes is calculated. The parameter data sets in Figure 2.2 could represent the data for any of the investigated parameters mentioned in Section 2.4 (p. 73).

Figure 2.2 – Calculating the deviation of each individual coda from the prototype.

Sample Composer 1												
Coda	Parameter 1 Data (P.1)	P.1 minus Mean	Absolute Value	Rank Data	Parameter 2 Data (P.2)	P.2 minus Mean	Absolute Value	Rank Data	Parameter 3 Data (P.3)	P.3 minus Mean	Absolute Value	Rank Data
A	5	2	2	4.5	3	-1.8	1.8	3.5	0	-1.4	1.4	0
B	3	0	0	1.0	6	1.2	1.2	2.0	0	-1.4	1.4	0
C	1	-2	2	4.5	3	-1.8	1.8	3.5	0	-1.4	1.4	0
D	4	1	1	2.5	8	3.2	3.2	5.0	0	-1.4	1.4	0
E	2	-1	1	2.5	4	-0.8	0.8	1.0	7	5.6	5.6	5
Prototype Value (mean):	3				4.8				1.4			

Coda	Rank Sum	Rank Sum/Mean Rank Sum (%)	Result divided by 2 (%)
A	8	114.29	57.14
B	3	42.86	21.43
C	8	114.29	57.14
D	7.5	107.14	53.57
E	8.5	121.43	60.71
Mean Rank Sum:	7		

The first step of the process involves subtracting the prototype value (i.e., the average of the parameter) from each value in the parameter data set. For Parameter 1 (P.1) in Figure 2.2, this involves subtracting 3 (the prototype value) from 5, 3, 1, 4, 2 (the parameter data set). Given that, in some cases, the prototype value may be larger than a value in the data set, the next step is to calculate the absolute values (i.e., remove the negative integer). The absolute values can then be ranked in order of size from smallest to largest, with the smallest value receiving the smallest rank (1). In examples where there are two equal values (e.g., the absolute values for Codas A and C for P.1), both values receive the average of the two ranks. In examples where the parameter data only includes a small number of entries (e.g., parameter 3 (P.3)), the ranks for the remaining data set are set to zero. This allows for any anomalous additions, such as the use of 'Turkish' instruments in H/100/4 to be identified and inhibits the anomaly from skewing the Rank Sum data. This entire process is repeated for every parameter data set in the sample.

With the rank data calculated for every parameter data set, the next step involves the addition of all the rank data. This data is displayed in Figure 2.2 in the Rank Sum column. To determine how close each coda is to the prototype, the Rank Sum data is divided by the Mean Rank Sum and, for atheistic purposes, divided by two. The results of this processing then allow for the prototypical coda to be identified. Zero percent represents the prototype and therefore, the smaller the percentage, the closer the coda to the prototype. In Figure 2.2, Coda B is identified as the most-conformant coda, numerically, to the prototype. Coda E is the least-conformant coda because it is the furthest from the prototype.

2.6 Identifying Correlations

Once the prototype data are established, and the most- and least-conformant codas identified with regard to these averages, this investigation, through the use of the Spearman's

Rank Correlation Test,[8] will then highlight individual parameters which undergo change throughout the composer's compositional output (time). SRCT is a non-parametric statistical test which assesses the linear association between two variables. It is best suited to this type of investigation because such non-parametric tests rely on the ranking of the data rather than the individual numerical values and therefore the results cannot be skewed by extreme anomalies (Crackle, 2014, pp. 29–30). For this investigation, a test result larger than the 0.05 (95%) critical value (the point in which the null hypothesis is rejected) will be deemed statistically significant, confirming a relationship between the two samples tested.

2.7 Summary

The methodology presented in this chapter provides a systematic approach to the study of the coda. By reducing the investigation sample to particular composers, a specific genre and form, the observations and results gathered will provide a clear and detailed illustration of the codas studied and avoid generalised vague representations. This thesis will study the coda in the symphonic first and final sonata-allegro and sonata-rondo movements by Haydn, Mozart and Beethoven. Section 2.4 (p. 73) outlines the data that will be collected regarding the coda, which includes the:

- raw lengths of the five structural sections,
- proportional lengths of the five structural sections,
- number of criteria used to identify the start of the coda,
- percentage of each chord-type used throughout the coda,
- chord diversity,
- harmonic rhythm,
- harmonic gradient,
- percentage of thematic material used throughout the coda,

[8] The Spearman's Rank Correlation Test will subsequently be referred to as SRCT in this thesis.

- thematic diversity,
- thematic repetition,
- percentage of each instrument used throughout the coda,
- total percentage orchestration,
- orchestration gradient.

Using this data, a series of prototype codas will be created for Haydn, Mozart and Beethoven, respectively, and following the methodology in Section 2.5.2 (p. 85), the prototypical codas for the individual parameters and the meta-prototypical coda will be calculated. Finally, through the use of the SRCT, this thesis will then highlight individual parameters which undergo change over time.

Although this methodology has been tailored to explore a specific sample, the numerical processes employed could also be used to study the coda in the works of other composers, and the coda in other genres and forms. In addition, the prototype and correlation methodology could be adapted and applied to other structural sections, for example to identify generalisations in the organisation of the sonata-form development section. The next chapter outlines, applies and analyses the eight criteria used to identify the coda in the sample.

Chapter Three – Identifying a Coda

3.1 The Eight Criteria

Beyond locating a clearly defined additional independent structural section that ends on the tonic (Leichtentritt, 1967, p. 155), there appears to be no standard operating procedure for identifying the presence of a coda section, let alone any clear methodology for identifying the beginning of this section. As a result, large proportions of codas, and the movements to which they are associated, are omitted from coda studies. An example of this can be found in Cavett-Dunsby's study of Mozart's codas (1988). 'Given that there is no consistent theoretical approach to finding a coda' (p. 32), Cavett-Dunsby's investigation is restricted to what she refers to as 'formal codas;' codas which 'begin after double barlines and repeat marks towards the end of the movement' (p. 32). Given, as this chapter will demonstrate, that a coda can exist without the presence of a double barline and repeats marks, Cavett-Dunsby's methodology omits a large sample of movements which contain a coda.

The absence of any methodology for identifying the coda has also contributed to the differing and unsupported views regarding the starting bar of the coda in a sonata-form movement. Take, for example, B/3/1. Schoenberg states that the coda of this movement is 135 bars long (1999, p. 186). Taking into account the total length of the movement, Schoenberg believes that the coda of the first movement begins at b. 557. However, in comparison, Grove (1896, p. 68) gives b. 551 as the beginning of the coda. From just these two examples, two possible starting points are presented for the coda.

Interestingly, neither account indicates how, or why, the chosen bars are identified as the starting point for the coda. The only thing that these two interpretations agree on is that there is a coda section present. Until a methodology is created for identifying the presence and start of a coda section, studies will be unable to engage consistently with the full range of codas present in sonata-form movements and unable to draw any meaningful generalisations regarding this structural section.

The first part of this chapter (Section 3.1) presents eight criteria, which when used in combination can identify both the presence and starting bar of a coda in a sonata-form movement. The starting bar of the coda is identified by the largest majority of conforming criteria. The data presented with regard to these eight criteria and the sample of symphonic first and final sonata-form movements by Haydn, Mozart and Beethoven will reflect the criteria's applicability and their efficiency in identifying the starting bar of the coda. The rate of application reflects the number of movements the criterion can be applied to producing a possible starting point for the coda. The efficiency of the criterion represents the number of movements in which the criterion identifies the starting bar of the coda agreed by the criteria majority. For example, a criterion may be applicable to 100% of the movements in the sample. However, the criterion may only successfully identify the starting bar of the coda in 65% of the movements.

The second part of this chapter (Section 3.2) provides two case studies demonstrating the application of the eight criteria in B/8/1 and H/44/1. The final section (Section 3.3) lists all of the symphonic first and final movements by Haydn, Mozart and Beethoven which contain a coda. In addition, this section will also identify any changing trends in the use of criteria across the output of the sample composers. For example, is criterion one more efficient in identifying the codas in Haydn's earlier or later symphonic movements?

One of the key aspects regarding the methodology employed in this chapter is the diverse number of criteria used. The main reason for engaging eight criteria is because one criterion alone cannot accurately identify the start of all the codas in the sample, although criterion two can be applied to all the movements containing a coda in the symphonic sample by Mozart and Beethoven. Another reason for the inclusion of multiple criteria is the issue of bias and the favouring of only one criterion regardless of its failings. Criterion two is often used by Caplin and Hepokoski and Darcy as the sole criterion in establishing the presence and starting bar of a coda. However, as will be seen in Section 3.1.2, in isolation, this criterion can often provide a starting bar for the coda different from that identified by the criteria majority.

In examples such as H/101/4 and B/3/1, multiple possible starting points for the coda can be identified, either by means of an individual criterion (indeed, numerous candidate starting points may be identified by the same criterion) or by the use of multiple criteria. By making use of a larger criteria-pool, it is possible to identify the starting point based on a majority of criteria. In the example of H/101, four of the criteria establish b. 250 as the start of the coda whilst only two (including criterion two) identify b. 258.

The decision to make use of numerous criteria also relates to current theoretical views on how the coda may be identified. One group of theorists may identify the start of the coda based on one criterion. However, their results may differ from the bars identified by a different group of theorists who base their findings on different criteria. For example, Cavett-Dunsby (1988, p. 32) clearly makes use of criterion one in her identification of the coda. However, Hepokoski and Darcy appear primarily to make use of criterion two (2006, p. 281), although there are exceptions; Caplin, who although relying upon criterion two, also makes use of criteria six and seven.

As will be discussed in Chapter Four, in the absence of a double barline at the end of the recapitulation, composers have explored different methods for integrating the coda and recapitulation sections. The eight criteria are not only a methodology for identifying the start of the coda, but they are also a tool for exploring how the coda begins.

Finally, by identifying a range of criteria, there is a greater chance this methodology of coda identification will be transferable to other works, genres and composers in future research. For example, basing the identification of the coda on criterion seven may be successful for large orchestral works, because the criterion relies on changes in texture and orchestration. However, this criterion may not be as effective in identifying the coda section in a piano sonata.

The following eight criteria (Table 3.1) follow the example of an earlier initial study into Beethoven's codas (Crackle, 2013). However, this initial research has been reorganised, adapted, developed and expanded as a result of studying a much larger sample in greater detail.

Table 3.1 – Eight criteria used to identify the start of the coda

Criterion	Description
1	The coda clearly begins after the development-recapitulation double repeat bar and/or is identified by the use of the word 'Coda'.
2	'The start of the coda is best located at the moment when the music of the recapitulation no longer corresponds to that of the exposition, even if that moment is not perceived as a structural beginning' (Caplin, 1998, p. 181).
3	'A return to the first bars of the development is a logical point of departure for a coda' (Rosen, 1988, p. 310).
4	A harmonic interruption (e.g., marked by the presence of a diminished-seventh chord or dominant-seventh in inversion) or inflection of material into the subdominant, supertonic, flattened supertonic, flattened submediant or tonic major/minor, marks the beginning of the coda.
5	The coda starts directly with a new repeated passage or repeats [sometimes sequentially] the last idea of the recapitulation (Caplin, 1998, p. 181).
6	'On few occasions, the start of the coda is unambiguous: the recapitulation is clearly over, rhythmic continuity is broken… and a new initiating unit begins the coda' (Caplin, 1998, p. 181).
7	'On few occasions, the start of the coda is unambiguous: the recapitulation is clearly over… the texture changes, and a new initiating unit begins the coda' (Caplin, 1998, p. 181).
8	Sonata-rondo specific: The coda begins with the final repetition of the main theme (A).

3.1.1 Criterion One

Possibly the most obvious of the eight, criterion one identifies the presence and beginning of the coda at the point following a development-recapitulation repeat and/or the presence of the term ‘coda’. This is a new addition to the criteria used in Crackle’s (2013) study of Beethoven’s codas. With the exception of a number of examples, including ‘the final number of Beethoven's *Ritterballet* music WoO.1, [which] is labelled “coda”’ (Smyth, 1985, p. 16), the use of the term ‘coda’ appears infrequently in Beethoven’s music and does not appear in any of the sample works of Crackle’s (2013) study or this thesis. Furthermore, Mies states that ‘the repeat of the second section of sonata-form (development and recapitulation), preserved by Mozart in the finale of the ‘Jupiter’ Symphony, was abandoned by Beethoven in his symphonies though not elsewhere’ (1982, p. 142). Given the need for a development-recapitulation repeat, criterion one is only applicable to the sample of movements by Haydn and Mozart.

Interestingly, within these two composers’ works, the application of criterion one differs. Although the identification of the coda after a development-recapitulation repeat is used for both Haydn and Mozart, it is only Mozart who uses the term ‘coda’. Figure 3.1, taken from M/202/4, demonstrates the application of criterion one. The music of the recapitulation ends at b. 205. Mozart indicates that the development and recapitulation are to be repeated and marks the following bar with the term ‘Coda’.

Figure 3.1 – Presence of double barlines, repeat marks and the term 'Coda' as indicators of the start of the coda in M/202/4 (bb. 201–210).

What is unusual about Mozart's use of the term 'coda' in the symphonic sample is its unsystematic application. It appears that Mozart uses the designation exclusively for final passages which stand after a movement in two-reprise design. However, he does not use it consistently. The term is only present in seven symphonies by Mozart (112/4, 130/2, 134/1, 134/4, 183/1, 183/4, 200/2, 201/2, 202/4), and even within those seven he is inconsistent in its application. In M/134, the first and second movements are sonata forms with labelled codas that follow a double barline which designates the end of the (non-repeated) development-recapitulation section. However, the closing passage which follows the development-recapitulation section of the finale, also in sonata form, is not labelled with the term 'coda' (Smyth, 1985, p. 184). Analysing the works which contain the term 'coda' and studying their chronological placement, there appears to be no obvious reason for the use of the term. The coda sections which are labelled are not constructed in any comparatively different fashion to other codas of the period.

Given the seemingly random application of the term ‘coda’ in Mozart’s symphonic works, it is possible that the term ‘coda’ in a number of these symphonies was added by a third party. Leopold Mozart’s influence and involvement in Mozart’s compositional process is well documented (Zaslaw, 1989, p. 2) and it is possible that it was Leopold who labelled these sections as codas. It is also possible that the term coda was added at a later date by an editor, publisher or musicologist. However, on inspection of the autograph scores, it appears, by undertaking graphoanalysis, that the handwriting of the term ‘coda’, in particular the letter ‘c’, is similar in orientation to that of the instrumental labels included in the autograph. Figure 3.2 shows a comparison of the handwritten word ‘coda’ and the handwritten instrumental labels from the M/112/4. This is also the earliest example of the term ‘coda’ used by Mozart in his symphonic output.

Figure 3.2 – Handwriting samples taken from Mozart Symphony K.112 autograph score (The Morgan Library and Museum, 2015, pp. 12v and 14v) showing similarities in written orientation.

With the exception of the ‘molto Allegro’ tempo indication, the spacing of the letters shown in these examples appears to be consistent. The height, width and size of the letters, although different for individual words (tempo and instrument text), maintain a similar shape throughout the duration of the word. In contrast, there appears to be some discrepancy in the connection between the capital and the lower-case letter in a number of words. The capital letter ‘A’ of the ‘Allegro’ tempo is connected to the following lower-case letter ‘l’ and there appears to be no gap between the capital and lower-case letters in the term ‘coda’. However, where capital letters have been used in the instrument texts (and even within the instrumental terms, the handwriting is inconsistent, with some words starting with a capital letter and others with a lower-case letter), there are clear spaces before the lower-case letter suggesting the presence of a different style of handwriting. Given the diversity of one individual’s handwriting style, it is expected that there will be some degree of variation. Take, for example, the three appearances of the phrase ‘da capo’. Although these three appearances have many similarities, the height and gap in which the ‘p’ joins the ‘o’ are different. With regard to the baseline habits (i.e., the positioning of the words above or below a central point), both the term ‘coda’ and the tempo indication are written on the top stave of the manuscript paper and the term ‘coda’, like the ‘da capo’ text, appears twice, suggesting a sole author. Unfortunately, this is weak evidence, because any additions made to the autograph at a later date would no doubt aim to follow any pre-established formatting.

The variation in the letter gradients could suggest some difference in handwriting style. The instrumental terms and the term ‘coda’ are written at a 90-degree slant from the horizontal line. However, the tempo indication and ‘da capo’ are written at a 127-degree slant. Although this could suggest that two individuals with differing handwriting styles had input into Symphony K. 112, it is possible that the tempo and ‘da capo’ markings were added during the composition process whilst Mozart was working at speed: many of the note stems also appear to contain an obtuse angle gradient (e.g., b. 3 of the second violin in Figure 3.2).

An analysis of the digital manuscript reveals a similarity between the ink colours of all the texts present. Table 3.2 details the hue, saturation and brightness for six ink samples analysed. By random sampling and measuring the hue, saturation and brightness of the ink colour of the term 'coda', the instrumental terms, the 'da capo', the tempo, the note heads and note stems, an average percentage-point difference of +/- 8 hue, +/- 23 saturation and +/- 48 brightness was detected. With such small variances recorded and given that the smallest variance was identified for hue, which represents the actual colour of the ink, there is strong evidence suggesting that the same ink was used for all text in the movement.

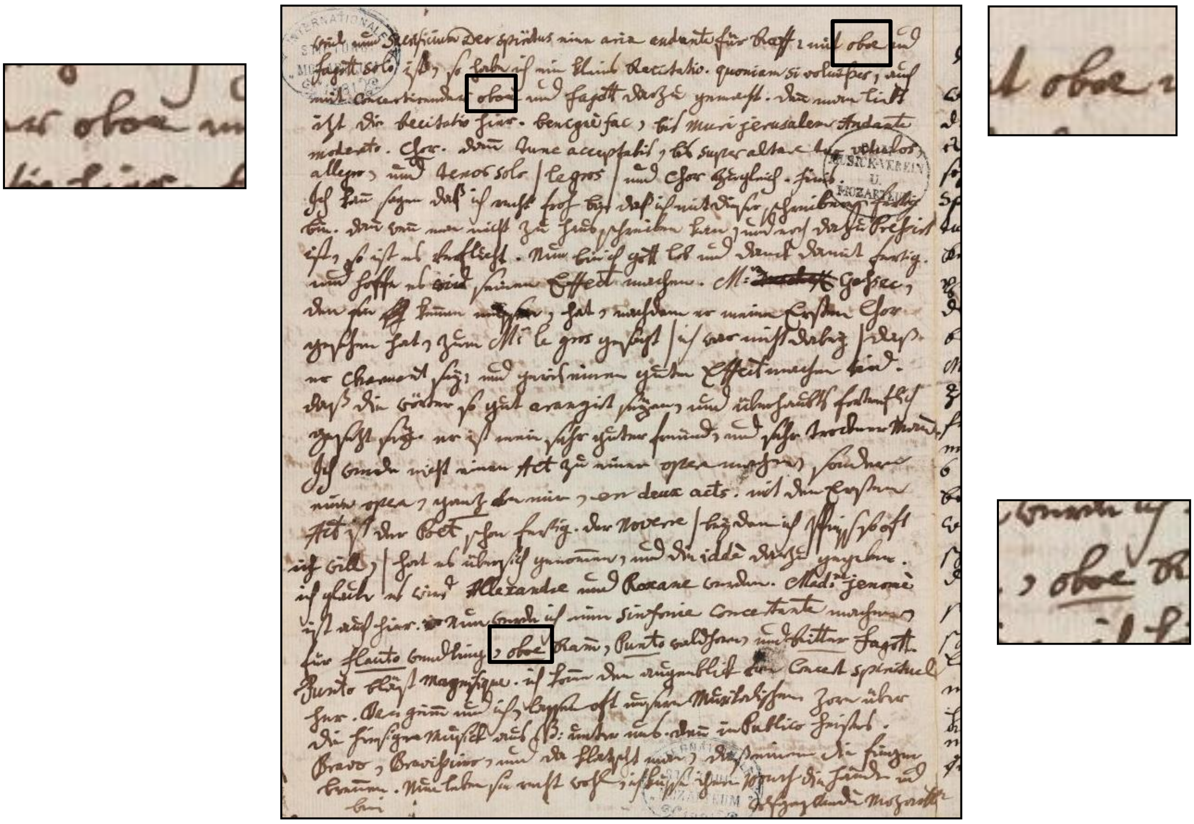
Table 3.2 – Hue, saturation and brightness values for the different text samples taken from the M/112/4.

Ink Sample	Coda				Instrumental Terms				Da Capo			
Random Sample	R.S.1	R.S.2	R.S.3	Average	1	2	3	Average	1	2	3	Average
Hue	29	15	26	23	30	29	31	30	32	31	27	30
Saturation	30	22	34	29	38	49	41	43	28	32	32	31
Brightness	142	115	133	130	143	116	139	133	104	109	85	99

Ink Sample	Tempo				Note Head				Note Stem			
Random Sample	R.S.1	R.S.2	R.S.3	Average	1	2	3	Average	1	2	3	Average
Hue	27	35	30	31	24	30	27	27	31	33	28	31
Saturation	53	49	55	52	49	44	34	42	48	37	35	40
Brightness	137	143	130	137	98	91	82	90	128	167	120	138

Finally, if the handwriting examples of K. 112 are compared to other handwritten texts by Mozart, in particular letters from Mozart which contain the same handwritten words, it becomes clear that the instrumental terms and the word 'coda' were indeed written by Mozart. This is illustrated in Figure 3.3.

Figure 3.3 – The handwritten word 'oboe' in a letter from Mozart to his father dated 5th April 1778 (Mozarteum Foundation Salzburg and The Packard Humanities Institute, 2006).



Although it could be argued that there appear to be two differing styles of handwriting present in the autograph score of Symphony K. 112, the similarities between these styles (e.g., the 'l' of 'molto' and of 'violini'), the similarities with handwriting in other letters by Mozart, and, as discussed in Section 2.1.4 (p. 66), Mozart's awareness of the term 'coda', suggests, with some certainty, that it was indeed Mozart who added the term 'coda' in his symphonic works. Nevertheless, the reasoning why only this select group of symphonies received the labelling is still elusive. At this stage of investigation, Smyth's comment regarding Mozart's use of the term 'coda' remains accurate: 'Inspection of these movements reveals nothing of particular import concerning codas' (1985, p. 184), and there appears no reason for the term's seemingly unsystematic use.

As discussed at the beginning of Section 3.1.1 (p. 94), criterion one only applies to the symphonic works of Haydn and Mozart in this investigation. Of these two composers and of all the movements which contained a coda section, criterion one can be applied to 8% of Haydn's and 38% of Mozart's symphonic sonata-form first and final movements. However, criterion one only successfully identifies the start of the coda in 6% of Haydn's and 34% of Mozart's symphonic sonata-form first and final movements.[9] Although criterion one may not be widely applicable in the sample under investigation, in the examples where criterion one can be applied there is a high rate of success in establishing the starting bar of the coda.

3.1.2 Criterion Two

One of the most widely recognised criteria for identifying the coda, criterion two identifies the presence and start of the coda at the point in which 'the music of the recapitulation no longer corresponds to that of the exposition, even if that moment is not perceived as the structural beginning [of the coda]' (Caplin, 1998, p. 181). Similarly, as Hepokoski and Darcy state, to identify the start of the coda one must:

> identify the referential or correspondence measures in the recapitulation that recapture the way in which the exposition has ended. In most cases once we are past the point where the last expositional measure has been retraced in the recapitulation – assuming an otherwise straightforward situation – we have moved into a coda (2006, pp. 281–282).

Figure 3.4 provides an example of criterion two used to identify the coda section in H/58/1.

As can be clearly seen from Figure 3.4, the material from the end of the exposition (bb. 42–50) is retraced in the recapitulation (bb. 128–135), with some amendment to accommodate the return of the material in the tonic key of F major. Criterion two identifies the be-

[9] Figure 3.25 in Section 3.3 (p. 147) shows the percentage of codas successfully identified using each of the eight criteria.

ginning of the coda section at b. 136 (indicated with an '*') – the point in which the recapitulation no longer corresponds to that of the exposition. This starting bar is then reinforced by the change in dynamics and the harmonic digression (discussed in Section 3.1.4 under the rubric of criterion four) of a dominant seventh (V/IV) which is sustained for the first five bars (bb. 136–140) of the coda.

Figure 3.4 – Application of criterion two in identifying the coda in H/58/1.

i) Bars 42–50 from the end of the exposition.

ii) Bars 128–139 from the end of the recapitulation and beginning of the coda.

Although criterion two has a 100% application rate for identifying a possible starting bar for the coda in the works of Mozart and Beethoven, the application rate for the works of Haydn is 92%. As Rosen suggests, ‘Haydn’s codas, at least in his later years, are inexplicably fused, even tangled, with his recapitulations: Beethoven’s, like Mozart’s, are often separate, articulated entities’ (1988 p. 394). Even Hepokoski’s and Darcy’s explanation for identifying the coda, by retracing the material of the exposition in the recapitulation, suggests that not all codas can be identified using this method, given their concession that at the end of the recapitulation ‘*assuming an otherwise straightforward situation* – we have moved into a coda’ (2006, pp. 281–282; emphasis mine). H/85/1 provides an example in which the coda cannot easily be identified using criterion two.

> Whereas the exposition presents the main theme twice, the recapitulation does so only once. The recapitulation does not undertake the wholesale re-composition of the exposition found in many of Haydn’s sonata-allegro movements but it does continue the practice of rescoring found in the exposition. This means that all five thematic statements in the exposition and recapitulation, and the altered statements in the development, are variants: there is no literal repetition (Riley, 2011, p. 40).

Although the percentages are high for the application of criterion two to the sample under investigation, criterion two is only able to identify the starting bar of the coda, as determined by the coda majority, in 66% of movements by Haydn, 63% by Mozart and 81% by Beethoven. Without supporting criterion two with other criteria, 44% of the codas identified in the movements by Mozart, will have the incorrect bar identified as the start of the coda. Figure 3.5 provides an example of criterion two ineffectively used to identify the coda section in M/250/4.

Figure 3.5 – Application of criterion two in identifying the coda in the M/250/4.

i) Bars 187–198 from the end of the exposition.

ii) Bars 438–461 from the end of the recapitulation and beginning of the coda.

The recapitulation finishes retracing the material of the exposition at b. 444 (indicated with an ‘*’) suggesting, according to criterion two, that the coda begins on beat three of b. 444. However, given the position of the double barline (criterion one), indicating a repeat of the development and recapitulation, coupled with the rhythmic break (discussed in Section 3.1.6 under the rubric of criterion six) at b. 453, the change in dynamic (b. 454) and reduced texture (discussed in Section 3.1.7 under the rubric of criterion seven), the passage from b. 444 to b. 453 appears to function as a transitional passage, linking the recapitulation back to either the beginning of the development or onto the coda. This form of transition is similar to those found at the end of a handful of first movements by Mozart which link directly to the second movement without pause, for example M/74/1. The concept of a transition as an operation of movement closure is discussed in Section 4.2.3.

3.1.3 Criterion Three

The third criterion is based on Rosen's assertion that the start of the coda can also be identified through finding the point at which the material at the start of the coda repeats that of the opening material of the development. He states that 'a return to the first bars of the development is a logical point of departure for a coda' (Rosen, 1988, p. 310). A study of H/52/4 (Figure 3.6) provides an example of how the return of the material of the development can be used as an indicator for the start of the coda. As can be clearly seen in Figure 3.6, following the rhythmic break (criterion six) at b. 155, the material of the development (bb. 73–80) returns and thus criterion three suggests that the coda begins at b. 156. In the case of H/52/4, the bar identified by criterion three is also supported by criterion two with the retracement of the exposition material ending at b. 154 in the recapitulation.

Rosen's comment regarding the use of development material in the coda, although suggesting it as a logical point of departure for the coda, does not discuss or quantify the number of works that follow this methodology. The application rates for the use of criterion three produce significantly different results than those of criterion two. Criterion three is valid for only 17% of the codas in movements by Haydn, and to only 25% by Mozart, but to 63% by Beethoven. These figures alone, regardless of whether or not the criterion accurately identifies the beginning of the coda (as determined by the majority of criteria), suggest an increase in the use of development material in the coda sections of these composers' works, with Beethoven exploiting the return of development material, relevant to the size of the sample, to a much greater extent. With regard to the efficiency of criterion three, the data shows that 11% of the codas by Haydn, 19% by Mozart, and 56% by Beethoven were identifiable using this criterion alone. It would appear that although Beethoven does not always make use of development material in his coda sections, when material from the development is present it often marks the start of the coda.

Figure 3.6 – Application of criterion three in identifying the coda in H/52/4.

i) Bars 73–80 from the beginning of the development.

ii) Bars 151–162 from the end of the recapitulation and beginning of the coda.

3.1.4 Criterion Four

Kerman suggests that 'codas as a matter of course draw upon all the resources available to their composers for the purpose of strengthening large-scale cadences. Beethoven not infrequently begins his codas by presenting a good section of the main theme in one of the subdominant-area keys before bringing it round to the tonic' (1982, p. 154). In response to Kerman's comments, criterion four locates the start of the coda at the point which involves the appearance of an unexpected chord or a change in the expected harmony. As stated by Kerman, and by Hepokoski and Darcy (2006, p. 282), an unexpected chord or interruption may involve the presence of a diminished seventh and/or dominant seventh in inversion, or an inflection of material into one of the subdominant-area keys (subdominant, supertonic, flattened supertonic or flattened submediant) (1982, pp. 154–155).

Figure 3.7, taken from M/425/1, demonstrates the start of the coda located using criterion four. The recapitulation ends with a reference to the ECM, moving towards the subdominant at b. 267 and arriving at the coda on the supertonic at b. 269. This bar is supported by criterion two because the music of the recapitulation no longer corresponds to that of the exposition at this point.

With regard to the application of criterion four, the number of movements the criterion can be applied to is similar to that of criterion three for Mozart and Beethoven, with criterion four applicable to 25% and 63% of the movements, respectively. In comparison to the low validity of criterion three for Haydn, criterion four can be applied to 55% of the sample movements for this composer. These figures would suggest that, although Haydn may not have favoured reusing development material at the start of his codas, he did make greater use of the harmonic interruption as an indicator of the start of the coda and as a compositional practice. Of the movements for which criterion four is eligible, 34% of the codas by Haydn, 3% by Mozart and 38% by Beethoven are identifiable using this criterion alone.

Figure 3.7 – Application of criterion four in identifying the coda in M/425/1 (bb. 263–270).

3.1.5 Criterion Five

Criterion five is derived from Caplin's study of how the start of the coda can be constructed. He states that 'the coda [can] start directly with a new model-sequence passage or repeat sequentially the last idea of the recapitulation' (Caplin, 1998, p. 181). If, as Caplin states, the coda section can begin with a sequential passage, then the start can also be identified by *locating* this material. If the first statement of material (which then goes on to be sequentially repeated) is located in the recapitulation, criterion five identifies the start of the coda at the first sequential repeat of material. However, if the first statement of material is not located in the recapitulation (i.e., it is not found in the closing passages of the exposition), criterion five identifies the first statement of material at the beginning of the coda. Figure 3.8, taken from B/3/1, demonstrates how the beginning of the coda can be constructed, and identified, based on sequential repeats of the material from the end of the recapitulation.

The five-note motif played by the flute, clarinet and bassoon at bb. 553–555 is repeated a major second lower by the first and second violins (bb. 557–559), followed by a second repeat in the flutes, oboes, bassoons and first violin (bb. 561–563) and six further repetitions in the second violin (bb. 565–577). Although the sequential movement begins in b. 553, these four bars are a part of the recapitulation. The first sequence of the recapitulation material does not begin until b. 557. As a result, based on Caplin's concept of coda organisation, the coda of B/3/1 begins at b. 557. This suggested bar is supported by the harmonic interruption of Db major (criterion four), the dynamic contrast to *forte*, and the thicker texture (criterion seven).

With regard to its application and efficiency, criterion five is applicable to 38%, 34% and 50% of Haydn's, Mozart's and Beethoven's movements, respectively. However, only 31% of Haydn's, 22% of Mozart's and 31% of Beethoven's codas are identifiable using this criterion alone.

Figure 3.8 – Application of criterion five in identifying the coda in B/3/1 (bb. 551–567).


Fl.
Ob.
Cl.
Bsn.
E♭ Hn.
E♭ Hn.
E♭ Tpt.
Timp.
Vln. 1
Vln. 2
Vla.
Vc.
Db.
a2
a2
dim.

3.1.6 Criterion Six

As witnessed in support of a number of the previous criteria examples, a common indicator of the presence and beginning of a coda is a break in the rhythmic continuity of the music. As Caplin states ‘on few occasions, the start of the coda is unambiguous; the recapitulation is clearly over, rhythmic continuity is broken… and a new initiating unit begins the coda’ (Caplin, 1998, p. 181). The main issue with the use of criterion six is determining what justifies a break in rhythmic continuity. As Caplin’s statement indicates, the continuity of the music must be interrupted, and a new section commence after the break. There are three primary indicators of a rhythmic break in the sample studied which I take as activating criterion six. The indicators include: silence, the cadence and the pause. [10] As discussed below, these indicators can be used alone or in combination to create a break in the rhythmic continuity of the music.

The first indicator of a rhythmic break involves the use of silence. ‘Silences have a purpose in music – they help to distinguish different sections of the score, [and] they allow listeners to shift their attention from one syntactic unit to the next’ (Knosch, 2005, p. 260). The use of silence as a device for creating interruption and signifying the start of the coda appears in a number of the movements included in the sample, including M/181/3; M/250/4 (Figure 3.5); H/25/3; H/52/4 (Figure 3.6); H/97/1, and B/7/1.

The second device which can cause a break in the rhythmic continuity of a work is the use of a perfect cadence. As Smyth suggests:

> The cadence is traditionally placed foremost among the agents of closure…. The operation of the musical cadence has often been compared to that of punctuation in prose

[10] Rhythmic discontinuity in the sample may also be created through a change in the hypermeter. As Rothstein states, ‘Beethoven often uses metric modulation in codas and codettas; there, converting a shadow hypermetre into the true hypermeter, [which] serves to emphasize closure, since it transforms a metrically weak cadence, on repetition, into one that is metrically strong’ (1995, p. 175). This suggestion, if explored in greater detail, may not only identify a further method for coda identification, but may also provide a further insight into the organisation of the sample coda sections.

> writing.… The cadence not only punctuates small segments (musical clauses, phrases, sentences…), but also helps to define the relationships among these, and thus affects the structuring of larger units (1985, pp. 35–56).

Furthermore, as Hepokoski and Darcy state with regard to the material of the exposition, 'one [of the] central feature[s] of sonata theory is its emphasis, after the onset of the secondary theme, on the attainment of the first satisfactory perfect authentic cadence that proceeds onward to differing material' (2006, p. 120). If a cadence can be used to mark the onset of differing material in the exposition, it stands to reason that it could function in the same way at the end of the recapitulation. Both of these definitions satisfy Caplin's statement regarding what justifies a break in the rhythmic continuity before the coda commences. As with the use of silence as a device for creating a rhythmic break, there are a number of examples present in the sample which make use of the emphatic cadence. These include M/133/1, H/59/1, and B/4/1.

Not only is the cadence a common device for indicating the end of the recapitulation and the start of the coda, it is also commonly found in combination with the use of silence. Examples of this device include M/181/3 (Figure 3.9), M/338/1, H/43/4, and B/1/1. In Figure 3.9, the material of the exposition, retraced in the recapitulation section, ends at b. 136. The conclusion of the recapitulation is unambiguous, the rhythmic continuity of the music is interrupted by the emphatic perfect cadence (bb. 135–136) and the *tutti* crotchet beat silence (b. 136). At this point a new initiating unit, played with a softer dynamic and reduced texture (criterion seven), begins the coda (b. 137).

Figure 3.9 – Application of criterion six in identifying the coda in M/181/3 (bb. 131–140).

The third compositional device used under this criterion to identify the coda through rhythmic discontinuity is the use of the pause. As Fuller suggests,

> Historically and in the most general sense, the pause is a sign for one part to pay attention to the others rather than to the beat, and to wait until everybody is ready before releasing or going on to the next note. It is used to mark the ends of phrases [or structural] sections (2001).

Although not present in the sample movements by Mozart, both Haydn and Beethoven make use of pauses as a means of closing the recapitulation and commencing the coda. In B/1/4 (Figure 3.10), the recapitulation (bb. 164–237) does not conclude as expected, after retracing the material from the exposition (bb. 6–97) (criterion two), but rather it continues with an additional six bars (bb. 232–237). These final six bars of the recapitulation contain two orchestral pauses (bb. 235 and 237) which slow down the pace of the movement and create a break in the rhythmic continuity. Given that a new initiating unit begins after the second pause, it is this pause coupled with the significant change in texture that marks the true end of the recapitulation and beginning of the coda. It is also worth noting that the use of the pause at end of the recapitulation and beginning of the coda mirrors the end of the six bar adagio introduction which leads into the exposition (Figure 3.11).

Figure 3.10 – Final six bars of the recapitulation and first two bars of the coda in B/1/4 (bb. 232–239).

Figure 3.11 – Opening six bars of the introduction and first two bars of the exposition in B/1/4 (bb. 1–8).

Although Beethoven makes use of the pause for creating rhythmic discontinuity, it is in the sample movements by Haydn where we find this used to the greatest extent. Not only does Haydn use this technique more often, but there are a number of examples where the pause is used in combination with the use of silence, as shown in H/98/4 (Figure 3.12). H/98/4 provides an example of this combination and in addition, provides an example of one of only a few works from Haydn's symphonic movements in which the coda is identified by the presence of a double barline (criterion one) and a change in tempo. Similar to B/1/4, the recapitulation ceases retracing the material of the exposition a number of bars before the end of the recapitulation (b. 321). The material following b. 321 is a slightly altered sequential repeat of bb. 317–319 (criterion five) with a bar's rest before the last sequential repeat (b. 324). The presence of the bar's rest before the beginning of the coda, and the combination of both the crotchet-beat silence and the indication to pause on the third quaver beat of b. 327, clearly indicate and reinforce the starting point of the coda.

Figures 3.13, 3.14 and 3.15 show the percentage breakdown of the three compositional devices used to create rhythmic discontinuity in the symphonic sample by Haydn, Mozart and Beethoven. As the figures show, Haydn, Mozart and Beethoven make use of these devices to create rhythmic discontinuity at the end of the recapitulation and beginning of the coda. The data for Mozart show an equal use of both silence and the cadence, with a number of examples using these two devices in combination (Figure 3.14). Beethoven, although favouring the use of silence to create a break in the rhythmic continuity, also makes use of the cadence – in isolation and in combination with silence – and the pause. However, it is Haydn who makes the use of the widest variety of devices to create rhythmic discontinuity, favouring the combination of silence and the cadence.

Figure 3.12 – Use of silence in combination with the pause to create a break in rhythmic continuity in H/98/4 (bb. 321–331).


Piú moderato
Fl.
Ob.
Ob.
Bsn.
Hn.
Tpt.
imp.
Piú moderato
ln. 1
ln. 2
Vla.
Vc.
p

Figure 3.13 – Classification of devices used to create a break in the rhythmic continuity and identify the start of a coda in Haydn's symphonic movements.

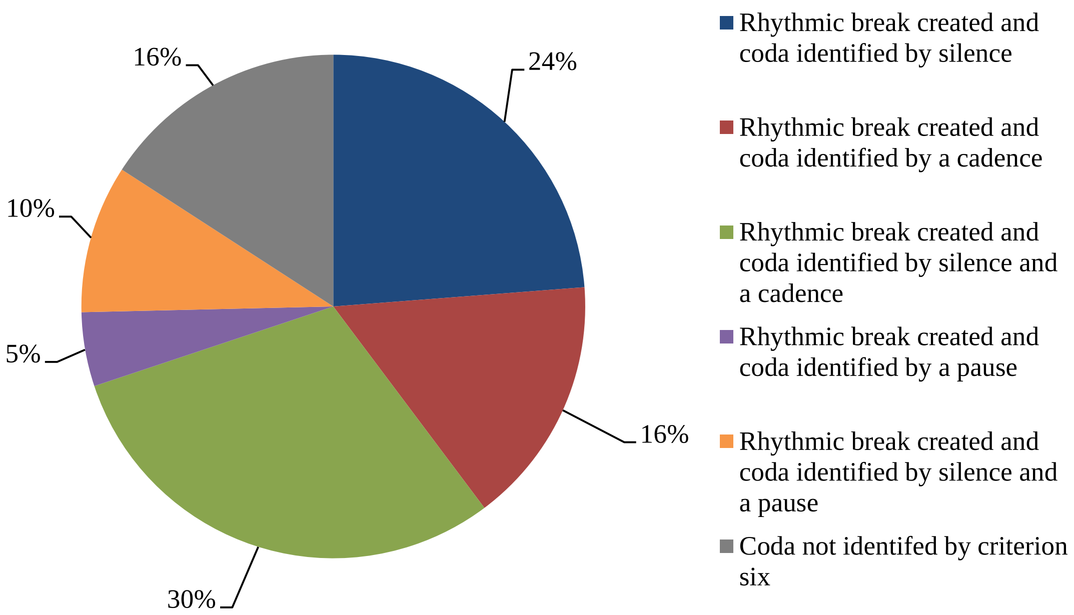


Figure 3.14 – Classification of devices used to create a break in the rhythmic continuity and identify the start of a coda in Mozart's symphonic movements.

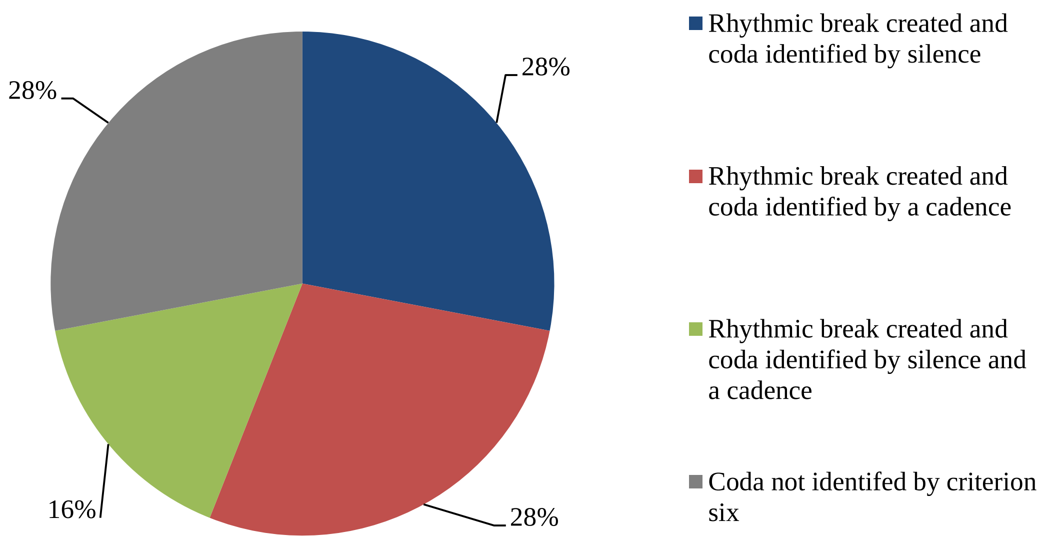
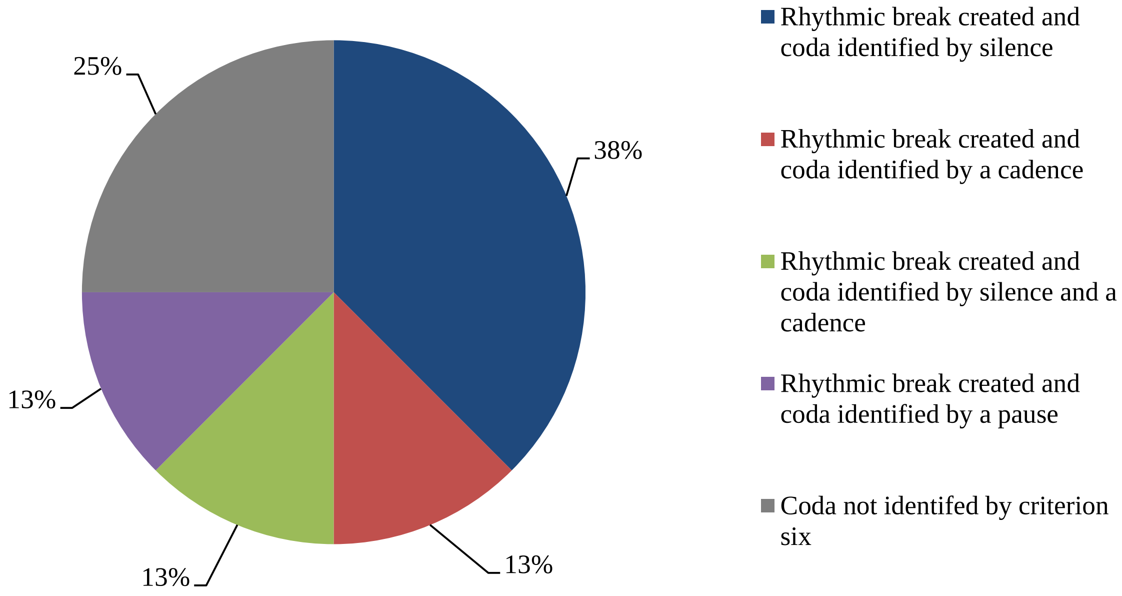


Figure 3.15 – Classification of devices used to create a break in the rhythmic continuity and identify the start of a coda in Beethoven's symphonic movements.



Criterion six it is the second most applicable criterion in the works of all three sample composers. It is applicable to 85% of the sample works by Haydn, 72% of those by Mozart and 75% of those by Beethoven. Furthermore, not only does the percentage application of the criterion remain high across the sample composers' movements, but the eligibility of criterion six in identifying the starting bar of the coda which agrees with the criteria majority is also very high. For Haydn and Mozart, criterion six is the most successful criterion in identifying the start of the coda established by the criteria majority, with 75% and 66%, respectively of the coda starting points identified agreeing with the criteria majority.

3.1.7 Criterion Seven

Similar to criterion six, criterion seven makes use of a secondary parameter to identify the presence and start of the coda section. Criterion seven identifies the presence and start of the coda as the point at which there is a significant change in texture. A change in texture is caused by a 50 percentage-point reduction or addition of instrumental parts. Caplin supports this criterion, stating that often when the rhythmic continuity of the music is broken at the end of the recapitulation and the coda begins it is emphasised by a change in texture (1998, p. 181). Figure 3.16 provides an example of criterion seven used to identify the presence and beginning of the coda section. This figure is coupled with Figure 3.17 which shows the changes in the number of instrumental parts present in each bar of M/183/1, from b. 184 (re-capitulation) to b. 208 (coda).

The recapitulation ends at b. 200 (according to criterion two) having established a *tutti* texture. The texture then diminishes to two parts (first and second violin) at b. 201. As seen in Figure 3.17, the largest change in texture is recorded at b. 202. Given the presence of the crotchet on the first beat of b. 201, the line graph does not show the textural change until b. 202. However, based on score observation it is clear the textural change occurs at b. 201 beat two. The bar identified by criteria two and seven is also supported by criterion one with the presence of a double repeat bar and the term 'Coda'.

In the case of K.183/1, the change in texture is clearly defined with the texture of the recapitulation remaining relatively constant before the coda change. However, this clarity is not always present in the symphonic sample. Take, for example, H/82/1, shown in Figure 3.18, which is accompanied by a graph of the changing number of instrumental parts from b. 174 (recapitulation) to b. 249 (coda) in Figure 3.19. As can be seen from Figures 3.18 and 3.19, the number of instruments present in each bar of the recapitulation and beginning of the coda changes more frequently and to a greater extent than in M/183/1. As a result, the application of criterion seven in insolation identifies numerous starting points for the coda including, most notably, bb. 234, 236, 240 and 248.

Figure 3.16 – Application of criterion seven in identifying the coda in M/183/1 (bb. 197–204).

Figure 3.17 – Bar-by-bar changes in the number of instruments sounding in M/183/1 (bb. 184–208).

Figure 3.18 – Application of criterion seven in identifying the coda in H/82/1 (bb. 231–249).

Figure 3.19 – Bar-by-bar changes in the number of instruments sounding in H/82/1 (bb. 174–249).

H/82/1 highlights two recurring issues with the application of criterion seven. The first involves the differentiation between a textural change and a significant textural change; the second relates to the identification of a starting bar when numerous significant textural changes are present. Without some form of distinction, and given the textural diversity of symphonic music, criterion seven could be applicable to every movement in the sample and, as with H/82/1, it could identify numerous starting bars within each of these movements. Other than the comment regarding changes in texture as an indicator of the start of the coda, Caplin makes no reference to what constitutes a significant change in texture, nor what procedure to implement in the eventuality that numerous starting bars are identified using this parameter.

In an attempt to maintain an objective approach to the application of criterion seven, a significant change in texture is recorded in this study when the number of instruments present decreases or increases by 50 percentage-points or more. For example, in b. 233 of H/82/1 there are twelve instrumental parts sounding (flute, first oboe, second oboe, bassoon, first horn in C, second horn in C, timpano, first violin, second violin, viola, cello and double bass), but this figure decreases by 50 percentage-points to six parts sounding in b. 234 (bassoon, first violin, second violin, viola, cello and double bass). The value of 50% as an indicator of a significant change in texture is not randomly chosen; it is in fact an average extrapolated from examples where the coda is clearly identified by the composer using criterion one (e.g., H/46/1, H/103/1 and M/134 and M/183).

Although this numerical boundary provides a solution to identifying a significant change of texture, it does not aid in identifying the starting point of the coda. In the case of H/82/1, even with the numerical boundary, there are still six possible starting points for the coda. This secondary issue can only be successfully resolved by comparing the criterion seven results with the other seven criteria. In H/82/1, by applying the remaining criteria, criteria two, four and six confirm and support b. 240, one of the bars identified by criterion seven, and thus they reinforce the interpretation of this bar as the start of the coda. It is worth noting that this issue of multiple possible starting bars is not isolated to just criterion seven. Although criteria one, two and three have not motivated this issue in the symphonic sample, there are a number of examples in which criteria four, five and six produce contradictory results. As with the procedure adopted for criterion seven, the bar with the largest number of criteria supporting it is that identified as the start of the coda.

As with criterion six, criterion seven has a high rate of applicability and eligibility in identifying the starting bar of the coda. Criterion seven can be applied to 60%, 63% and 69% of Haydn's, Mozart's and Beethoven's movements, respectively. Of the movements criterion seven can be applied to, 45%, 44% and 50% of the codas in the works of Haydn, Mozart and Beethoven are eligible to be identified using this criterion.

3.1.8 Criterion Eight

Given that the sample under investigation addresses the coda in both sonata-allegro and sonata-rondo form, it is possible that there are methods for identifying a coda in a sonata-rondo movement that do not apply to the identification of a coda in a sonata-allegro movement and vice versa. The final criterion, based on the studies of Tovey (1956), Berry (1985) and Caplin (1998), is designed to identify the coda in a sonata-rondo movement. There does not appear to be any significant difference in the applicability and eligibility of the seven criteria in identifying the coda in a sonata-allegro or sonata-rondo movement. For example, in identifying the coda in H/102/4, criteria two, three, four, six and seven can be applied, with all but criterion four identifying the same starting bar for the coda. However, on closer inspection of the sonata-rondo examples, it becomes apparent that a possible further indicator of the coda may be utilized.

Caplin states 'following the norms of rondo forms in general, the last couplet of a sonata-rondo leads to a final statement of the refrain' (1998, p. 235). As a result, criterion eight identifies the start of the coda in sonata-rondo movements in relation to this final statement of the refrain (i.e., the rondo theme). The issue regarding this approach is the identification of the final refrain as either part of the recapitulation or part of the coda; i.e., does the coda begin *after* the final refrain has ended, or is it coterminous *with* the final refrain? 'The relation of the final refrain to the coda is somewhat problematic, with most theorists tending to see the coda as a separate section following the final refrain' (Caplin, 1998, p. 235). That said, Berry is not clear about his views on this theoretical issue. However, his one complete analysis from the final movement of Mozart's Trio, K. 502 places the coda after the final refrain (1985, p. 213). Similarly, Tovey's (1956) views are ambiguous, stating that 'the coda may contain a final re-turn of the rondo-theme' (p. 193). However, once again, as Caplin notes, Tovey also refers to situations in which the coda occurs after the refrain. The following two examples provide cas-es of both interpretations of the final refrain. The first (Figure 3.20) provides an instance of the coda section beginning with the final refrain.

Figure 3.20 – Application of criterion eight in identifying the coda in H/102/4 (bb. 254–276).


*
Fl.
Ob.
Bsn.
B♭ Hn.
Tpt.
Timp.
Vln. 1
Vln. 2
Vla.
Vc.


Fl.
Ob.
Bsn.
B♭ Hn.
Tpt.
Timp.
Vln. 1
Vln. 2
Vla.
Vc.
p

The end of the recapitulation, at b. 260 (indicated with an '*'), is marked with a clear break in the rhythmic continuity (criterion six), and a change in texture (criterion seven). However, there is no final statement of the 'A' refrain (ABA C ABA). Instead, the material following b. 260 consists of a fragmented repeat of the opening material of the movement which, ipso facto, forms the final statement of the 'A' refrain. However, this fragmented version of the final 'A' statement does not match the material in the exposition but, ipso facto, emulates the start of the development. As a result, the coda begins at b. 260, like the development, with a fragmented version of the final 'A' refrain. Owing to the opening material of the coda matching that of the development, criterion three can also be applied, supporting an interpretation of b. 260 as the start of the coda.

The second example, taken from M/181/3 (Figure 3.21), shows the coda commencing after the final refrain has ended. The original 16 bar (8+8) refrain (bb. 1–16) is repeated as expected (as per current sonata-rondo theory) at the end of the recapitulation. If this example were interpreted in the same manner as H/102/4, then the coda would begin at b. 121. However, given that the refrain material is then repeated after the final refrain (bb. 137–151) suggests that the refrain in bb. 121–136 is not unlike in H/102/4, the beginning of the coda, but is actually the final bars of the recapitulation. If b. 121 were the beginning of the coda, it is questionable why Mozart begins the coda with 32 bars of main refrain material (8+8+8+8). With this taken into consideration, the coda begins in this example at b. 137 (indicated with an '*'), after a complete repetition of the exposition material in the recapitulation. This starting bar is supported by the contrast in dynamics,[11] the break in rhythmic continuity (criterion six) and the significant change in texture (criterion seven).

[11] Although not mentioned as an independent criterion, the presence of a change of dynamic often combined with criteria six and seven often acts to emphasise the beginning of the coda. Given the number of editions of the works in the sample, without further large-scale enquiry into the original autograph scores, it is not possible to attribute this possible criterion to the sample composers and as a result, this secondary parameter has not been added as a method of coda identification.

Figure 3.21 – Application of criterion eight in identifying the coda in M/181/3 (bb. 116–140).

In the case of Haydn's Symphony No. 102, it would be difficult to argue that the fragmented return of the refrain is not part of the coda. However, in M/181/3 it is also clear that the coda begins after the final refrain. As a result, the application of criterion eight must identify the coda at two possible starting points: either at the start of the final 'A' refrain or after the final 'A' refrain.

Although the start of the coda in all three of Beethoven's sonata-rondo movements could be identified using criterion eight (B/2/4, B/6/5 and B/8/4), only 50% of the codas in the sonata-rondo movements by Mozart and Haydn could. Caplin's remarks regarding the final refrain summarise the success of criterion eight as a method for identifying the coda:

> It would seem, then, that there is no consistent relation between the beginning of the coda and the beginning of the final refrain… The rondo refrain always appears somewhere in the coda, often at the beginning, but sometimes only after the coda is underway. Like all subsequent appearances of the rondo refrain, the final restatement may be complete but may also be abridged or remain incomplete. In a number of cases, the

basic structure of the refrain fails to appear at all, and only its initial motives are used (1998, p. 239).

3.2 Criteria Application Case Studies

The following subsection provides two examples, demonstrating the application of the eight criteria to the thesis sample. The first case study (Section 3.2.1) demonstrates the identification of the start of the coda section through the conformity of five of the eight criteria. The second case study (Section 3.2.2) provides an example of conflicting criteria and the approach used to decide the starting bar of the coda. Riley states in his discussion of Haydn's recapitulations, for every rule or theory that one lays down, one is likely to be confounded by a counterexample (2015, pp. 1–2). Identifying the start of the coda based on the largest number of conforming criteria encounters the same issue. Although the methodology successfully identifies the starting point of the coda in the majority of movements, there is some (10% of the whole symphonic sample) in which there is an equal number of criteria identifying different coda starting points. These movements include M/425/1, H/44/1 and B/2/4. In examples such as these, the candidate starting bars are studied, sub-rosa, in further detail and a decision is made based on the criteria used to identify the strongest candidate (e.g., the presence of the term 'coda' (criterion one) may be a strong indicator of a specific bar regardless of the split majority) and their position within the movement.

3.2.1 Case Study One – B/8/1

Case study one provides an example where five of the eight criteria discussed agree on the same bar. From discussion of criterion one it is known that Beethoven does not use the term 'coda' in any of his symphonies. Furthermore, given that B/8/1 is a movement in sonata-allegro form, it is obvious that criterion eight will not be applicable. The recapitulation section closely retraces the material of the exposition and criterion two identifies the end of the recapitulation and beginning of the coda at b. 301^2 (indicated with an '*'). This point is supported by a range of further criteria including six and seven. As Figure 3.22 shows, the recapitulation comes to a close with an orchestral tutti (bb. 297–301^1) and a series of rhythmic breaks (criterion six). The most prominent of these breaks occurs at b. 301^2, coupled with a significant change in texture from orchestral *tutti* to solo bassoon (criterion seven). The material which follows b. 301^2 also resembles the opening of the development section (bb. 105–111) and this allows for the application of criterion three. Furthermore, although the first two bars of solo bassoon (bb. 301–302) may suggest a continuation of F major established at the end of the recapitulation, the addition of the second violin, viola and clarinet shifts the harmonic focus towards the flattened submediant chord Db major. As a result of this, criterion four can also be applied to the movement, supporting the passage beginning at b. 301^2 as the start of the coda.

Figure 3.22 – Application of the eight criteria in identifying the coda in B/8/1 (bb. 297–307).


Fl.
pp
Ob.
pp
Cl.
pp
Bsn.
pp
Hn.
F Tpt.
Timp.
Vln. 1
p
pp
Vln. 2
p
pp
Vla.
p
pp
pizz.
Vc.
pp

3.2.2 Case Study Two – H/44/1

The eight criteria applied to H/44/1 reveal two possible starting bars for the coda, supported by two criteria each. The first possible starting point for the coda (indicated with an '$*^1$') – b. 136 – is identified by criteria two and five. The recapitulation ceases to retrace the material of the exposition at b. 135. A new initiating idea (b. 136) based on the closing material of the recapitulation and repeated sequentially (bb. 137–138), begins the coda, as shown in Figure 3.23.

The second starting bar (indicated with an '$*^2$') is identified four bars later (b. 140) by criteria four and six. The material of the recapitulation may end at b. 135, but it is not until b. 140 that there is a break in the rhythmic continuity and the presence of a harmonic interruption in the form a D♯ diminished-seventh chord. With these four criteria identifying and equally supporting two different starting bars for the coda, the methodology is unsuccessful in definitively identifying the start of the coda. In the 10% of examples such as this, the procedure used to identify the start of the coda involves two steps.

The first involves looking at the starting bar of the coda as identified by criteria not involved in the current dispute. In a number of examples, some of the other criteria, although not identifying one of the two candidate starting bars, may identify a bar in close proximity. In cases such as these, the additionally deployed criteria are not counted towards the majority but, where necessary, they are used to determine the starting bar of the coda. If no further criteria are applicable, or if the criteria present are equally spaced between the two possible starting points, then the earliest candidate bar identified is taken to be the start of the coda. As will be discussed in Section 4.2, the position of the bars identified by different criteria in relation to one another, when the criteria do not agree on the same starting point for the coda, provides an insight into how the coda is connected to the recapitulation.

Figure 3.23 – Application of the eight criteria in identifying the coda in H/44/1 (bb. 134–145).

In the case of H/44/1, and although not occurring at b. 140, the significant change in texture (criterion seven) at b. 141, coupled with the change in dynamics, can be used to support one of the identified starting bars of the coda. Given its proximity to the bar identified by criteria four and six, it is reasonable to assert that the coda begins at b. 140.

3.3 Analysis

With the eight criteria for identifying the coda established, those in the symphonic sample by Haydn, Mozart and Beethoven can now be located. Tables 3.3, 3.4 and 3.5 list all the movements which contain a coda section and the criteria used in their identification. On observation of the three tables, the need for multiple criteria is clearly justified. None of the criteria in isolation can be used to locate the start of the coda. On average, three criteria are used in conjunction to locate the start of the coda (Haydn: 2.79, Mozart: 2.5, Beethoven: 3.31). Figures 3.24 and 3.25 summarise the rates of applicability and eligibility for each criterion applied to the sample.

Table 3.3 – Movements containing a coda, criteria used to establish the presence of the coda and the identified starting bar in the symphonic first and final movements by Haydn.

Haydn	Criteria								Starting Bar of the Coda
Work/Movement	1	2	3	4	5	6	7	8	
4/3		✓				✓			114[2]
107/3	✓	✓				✓			67
13/4		✓	○				✓		145
17/3		✓		✓	○				66[3]
18/3		✓			✓	○		✓	92
23/4		✓			✓	✓			87[2]
25/3		✓				✓			104
34/4		✓						✓	96
43/4	✓	✓				✓	✓		162
44/1		○		✓	○	✓	✓		140
44/4		✓		✓	✓	✓			166[4]
46/4	✓	○				✓	✓		153
52/4		✓	✓	○		✓			156
53/4a		✓		○	✓	✓	✓	✓	125
54/1		✓		✓	✓	✓			198
56/1		○				✓	✓		249
58/1		✓		✓					136
59/1		✓				✓	✓		131
67/1		✓			✓	✓			243[3]
69/1		✓			○				167
71/4		✓			✓	✓			156
73/1		✓		✓					137
75/1		✓		○		✓	✓		135
76/4		○			○	✓	✓		147[2]
77/1		✓			✓	✓			177
77/4		○			✓	✓	✓		173[4]
81/1		✓					○		158
82/1		○	○	○		✓	✓		239
82/4		○				✓	✓		235[4]
83/4		○		○		✓	✓		79[4]
84/4				✓		✓	✓		256[2]
86/1		○	✓	✓		✓	○		177
86/4		✓		✓		○			138
87/4				○		✓	✓		193[4]
88/1		✓			✓	✓	○		247
88/4		○		✓		✓		○	195
89/1		✓				✓	○		147

90/1		✓		○		✓	○		206
90/4		✓		✓	✓	✓	✓		172
91/1		✓					✓		245
91/4		○			○	✓	✓		200
92/1		✓				✓	✓		200
92/4		✓	✓			✓	✓		298[2]
93/1		○		○		✓	✓		237
94/4		○		○		✓		✓	225[2]
95/4				✓		✓	○		181
96/1		○		○		✓	✓		183
97/1		✓		✓	✓	✓			240
97/4		✓		✓	✓	✓	○	○	245[2]
98/1		✓	✓	○		✓			279
98/4	✓	○		○	○	✓	✓		327[2]
99/1		✓			○	✓	✓		191
99/4		✓		✓		○	○		246
100/4		✓		○	✓		✓	○	296[2]
101/1		✓		✓		✓	✓		314
101/4		○		✓	○	✓	✓	✓	250
102/1		○	○	✓	○	✓	○		261
102/4		✓	✓	○		✓	✓	✓	261
103/1	✓	○		✓		✓	○		201
103/4a		✓	✓	✓	✓	✓	✓	○	350[2]
103/4b		✓	✓	✓	✓	✓	✓	○	350[2]
104/1		○	○			✓	✓		266[4]
104/4		✓		✓		✓	✓		265

○	Applicable for the identification of the coda starting bar
✓	Eligible for the identification of the coda starting bar

Table 3.4 – Movements containing a coda, criteria used to establish the presence of the coda and the identified starting bar in the symphonic first and final movements by Mozart.

Mozart	Criteria								Starting Bar of the Coda
Work/Movement	1	2	3	4	5	6	7	8	
K.133/1		✓			✓				169[2]
K.134/1	✓	✓				✓			156
K.134/4	✓	✓				✓			131
K.161/3		✓				✓	✓		145
K.184/3		✓		○			✓		203
K.199/3	✓	○	✓		○	✓	○		283
K.181/3		✓				✓	✓	✓	137
K.182/1		✓	✓			✓			131
K.183/1	✓	✓					✓		201
K.183/4	✓	✓	✓	✓			○		187
K.201/1	✓	○							185
K.201/4	✓	○							166
K.202/1		✓	✓			✓			198
K.202/4	✓	✓			✓				206
K.200/1	○	✓				○	○		160
K.200/4	✓	✓		○			✓		172
K.121/3		○	✓		○	✓			190
K.250/1		✓	✓	○		✓	✓		259[2]
K.250/4	✓	○				✓	✓		454
K.297/1		○			✓	✓	✓		238
K.320/1		✓		○	✓				251
K.320/3		✓			✓	✓	✓		249[2]
K.338/1		✓				✓	○		237[4]
K.338/3		✓	○	○	○		○		277
K.385/4		✓		○	✓	✓	✓	○	216
K.425/1		○	○	○	✓	✓	✓		265[2]
K.425/4		○			○	✓	✓		367[2]
K.543/1		○				✓			292[3]
K.543/4		○				✓	✓		231
K.550/1		○				✓	✓		277
K.550/4		○				✓	✓		285
K.551/4	✓	✓				✓	○		356

○	Applicable for the identification of the coda starting bar
✓	Eligible for the identification of the coda starting bar

Table 3.5 – Movements containing a coda, criteria used to establish the presence of the coda and the identified starting bar in the symphonic first and final movements by Beethoven.

Beethoven	Criteria								Starting Bar of the Coda
Work/Movement	1	2	3	4	5	6	7	8	
1/1		✓	○	✓	✓	✓	✓		259[2]
1/4		○		○		✓	✓		238
2/1		✓	✓	○	○	✓	✓		304
2/4		○	✓	○	○	✓		✓	293[4]
3/1		✓		✓	✓				557
4/1		○			○	✓	✓		451
4/4		✓	✓			○	✓		278
5/1		✓		○	✓		○		374[2]
5/4		○	✓	○			✓		294
6/1		✓	✓		✓	○			418
6/5		✓					✓	✓	177[2]
7/1		✓	✓	✓		✓	○		389
7/4		✓	✓			○			341
8/1		✓	✓	✓		✓	✓		301[2]
8/4		✓	✓			✓	✓	✓	267
9/1		✓	✓		✓				427

○	Applicable for the identification of the coda starting bar
✓	Eligible for the identification of the coda starting bar

Figure 3.24 – The percentage of movements in the sample each of the eight criteria can be applied to identify the coda.

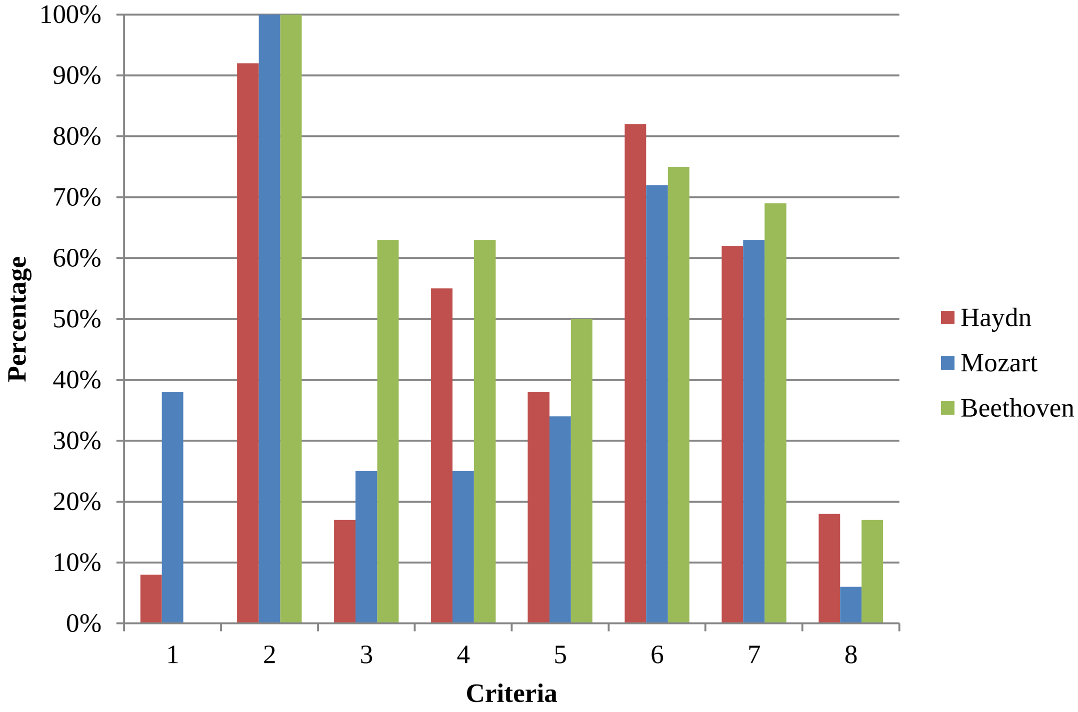
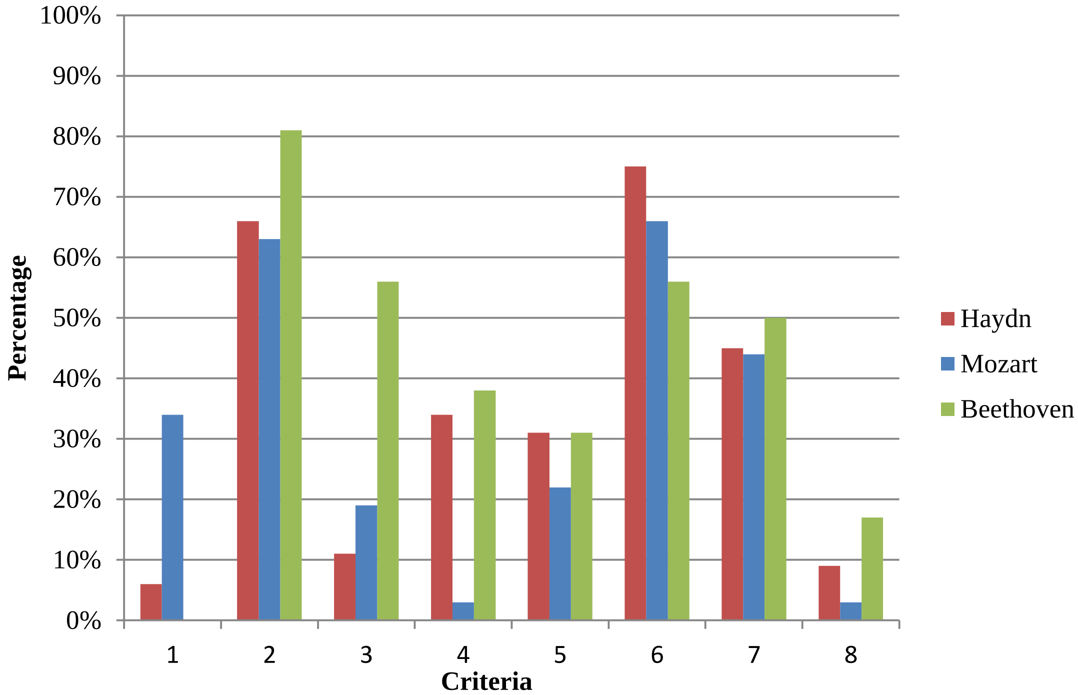


Figure 3.25 – The percentage of coda starting bars identified using each of the eight criteria.



Interestingly, Figure 3.24 shows a number of similarities between the applicability of the criteria across the output of all three composers. Criteria two (the coda begins when the music of the recapitulation no longer corresponds to that of the exposition), six (the coda begins when there is a break in the rhythmic continuity) and seven (the coda begins when there is significant change in texture) are the most applicable criteria for all three composers. Furthermore, given that the coda follows the recapitulation section, it is no surprise, with the exception of a selection of Haydn's works (where the material of the exposition repeated in the recapitulation is often too fragmented to trace), that criterion two is the most applicable.

However, with regard to the eligibility of the criteria in identifying the starting bar of the coda, criterion two is not as clear an indicator of the start of the coda as Figure 3.24 might suggest. As seen by comparing Figures 3.24 and 3.25, in the case of Mozart and Haydn the presence of a break in the rhythmic continuity of the music is a more eligible method of coda identification than retracing the material of the exposition in the recapitulation. The percentage-point difference between the applicability and eligibility of criterion two in identifying the start of the coda in the works of Haydn and Mozart is 26% and 37%, respectively. However, the percentage-point difference between the applicability and eligibility of criterion six is only 7% and 6%.

Not only can the data collected be used to calculate the average number of criteria applicable to an individual movement, the most commonly applicable and the most eligible criteria, but the data plotted against time provides an insight into the changing relevance of each individual criterion throughout each composer's sample. Figures 3.26, 3.27 and 3.28 provide a linear trendline display of the changing applicability of the eight criteria across the sample output of Haydn, Mozart and Beethoven.

Figure 3.26 – The changing applicability of the eight criteria in identifying the start of the coda across time in Haydn's symphonic sample.[12]

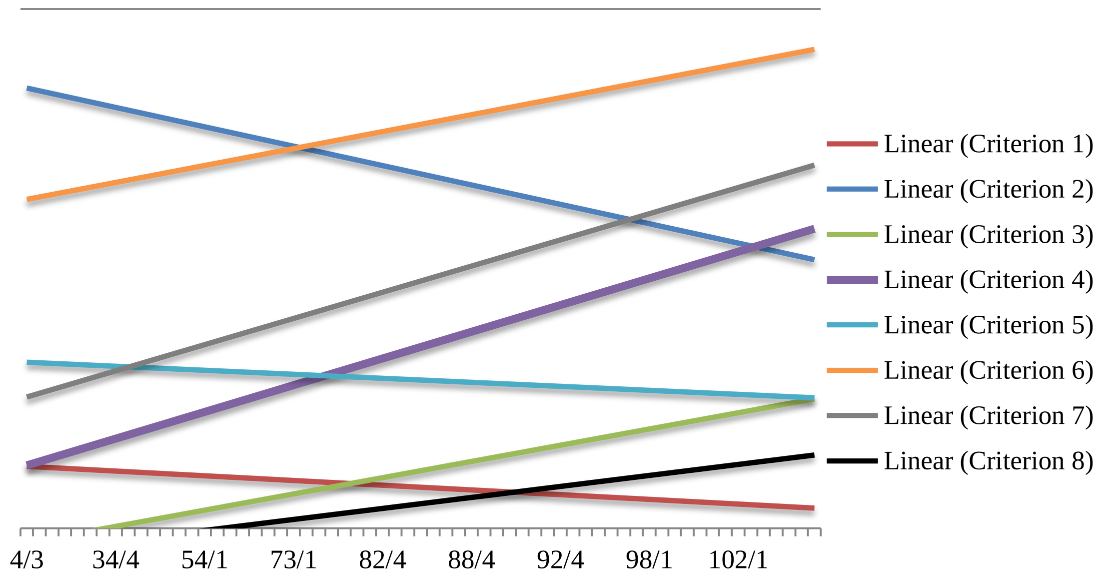
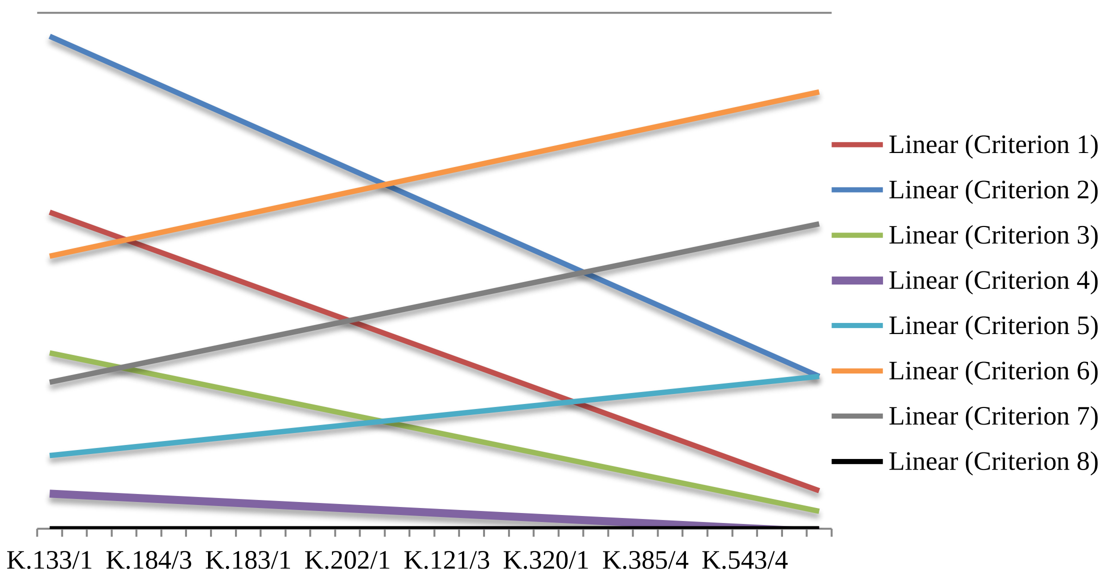
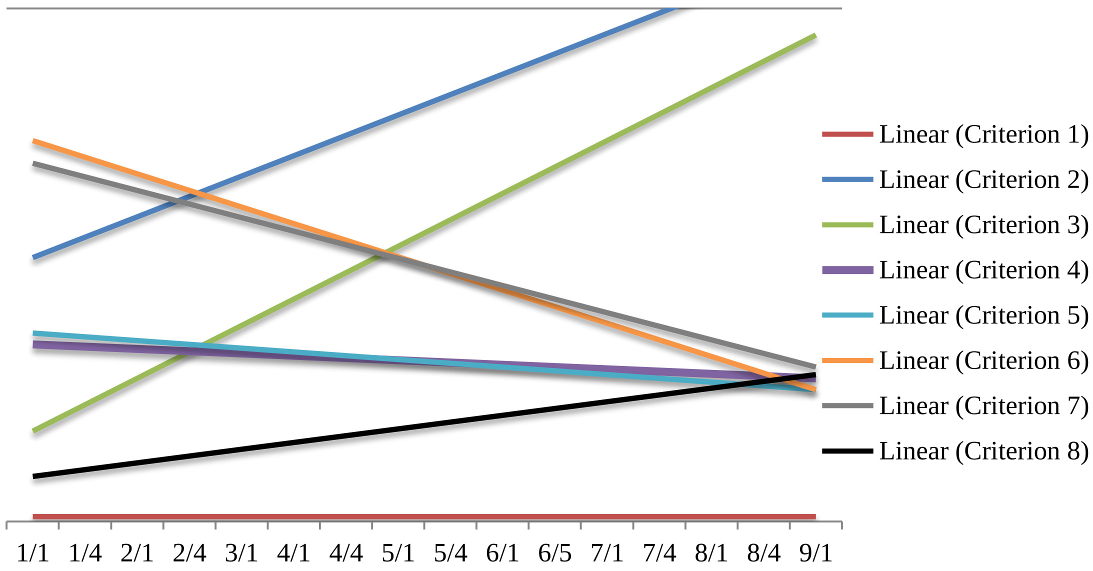


Figure 3.27 – The changing applicability of the eight criteria in identifying the start of the coda across time in Mozart's symphonic sample.



[12] The closer the trendline is to the top of the chart, the more applicable the criterion is in identifying the starting bar of the coda.

Figure 3.28 – The changing applicability of the eight criteria in identifying the start of the coda across time in Beethoven's symphonic sample.



What is perhaps most interesting about the data in Figures 3.26, 3.27 and 3.28 are the similarities between Mozart and Haydn and the differences between these two composers and Beethoven. For both Mozart and Haydn the use of criteria six and seven increase across their output. It could be speculated, given that these two secondary-parameter criteria are the most aurally recognisable, that this increase was in response to the coda becoming more established, longer in length and more complex, and as a result requiring greater foregrounding as an independent section for the listener. In contrast, Beethoven's use of criteria six and seven appears to decrease across his output. This would support arguments which hold that Beethoven's codas became more organic, with greater integration into the recapitulation, and it could also be interpreted as an indicator of his compositional approach moving away from the Classical style. Without expanding the study to incorporate a larger sample of works and without exploring the psychological impacts of secondary parameters on the listener, these concepts can only be theorised at this stage.

In contrast again to Mozart and Haydn, Figure 3.28 shows an increase in the applicability of criteria two and three and a decrease in the applicability of criteria six and seven in the movements by Beethoven. Not only do these trends support the organic nature of Beethoven's later works, but the increase in criterion three could also suggest that the material of the development is a greater component, in comparison with Haydn and Mozart, of the coda in Beethoven's symphonic first and final movements. In contrast, the decline in the applicability of criterion three in the works of Mozart could suggest a reduction in the presence of development material in Mozart's late codas. This hypothesis will be explored in Section 6.3.3.

3.4 Summary

As stated at the beginning of this chapter, up until now no methodology has existed for identifying the presence, let alone the beginning, of a coda section in sonata-allegro and sonata-rondo movements. This chapter provides not only a series of criteria for locating possible starting bars for codas and, subsequently (unlike Cavett-Dunsby's (1988) study), a complete list of codas present in the symphonic first and final movements of Mozart, Haydn and Beethoven, but it also offers a systematic methodology for coda identification which can be applied to works, composers and genres beyond those of the present sample. The following chapter explores how closure is created and how the coda is initiated in the first and final symphonic movements by Haydn, Mozart and Beethoven.

Chapter Four – Movement Closure

4.1 Introduction

Chapter Four explores how closure is created and how the coda is initiated in the first and final symphonic movements by Haydn, Mozart and Beethoven. Section 4.2 explores the methods employed by Haydn, Mozart and Beethoven to create closure in a symphonic sonata-form movement chronologically prior to the addition of a coda. It identifies which of these methods for closure, including the use of the coda, were used the most by each of these composers and, by chronologically ordering the movements containing these varying forms of closure, discovers the changing trend in how closure was achieved over the 60-year period of study. In addition to the list of movements containing a coda in Chapter Three, the movements concluded using different methods of closure are recorded in this chapter. Section 4.3 explores how Haydn, Mozart and Beethoven initiate the coda at the end of the recapitulation. As with the first stage of this chapter, data will be provided detailing the percentage use of each of the methods identified and how, if applicable, these change over the period of study.

4.2 Creating Closure

Not only did the creation and application of the eight criteria in Chapter Three identify the movements in the sample which contain a coda (Tables 3.3, 3.4 and 3.5), but they also subsequently identified three further methods for concluding a movement. These additional methods of closure are referred to in the following chapter as ‘closing operation one’ (CO1), ‘closing operation two’ (CO2) and ‘closure through transition’ (CTT). These closing operations are discussed below with reference, where applicable, to movements by each of the sample composers. An initial mention of ‘closing operation three’, i.e., a ‘coda’, is also provided, detailing the basic features that determine this category. However, this subsection will not discuss the compositional and functional traits of this closing operation. These will be explored and discussed in greater detail in the subsequent chapters.

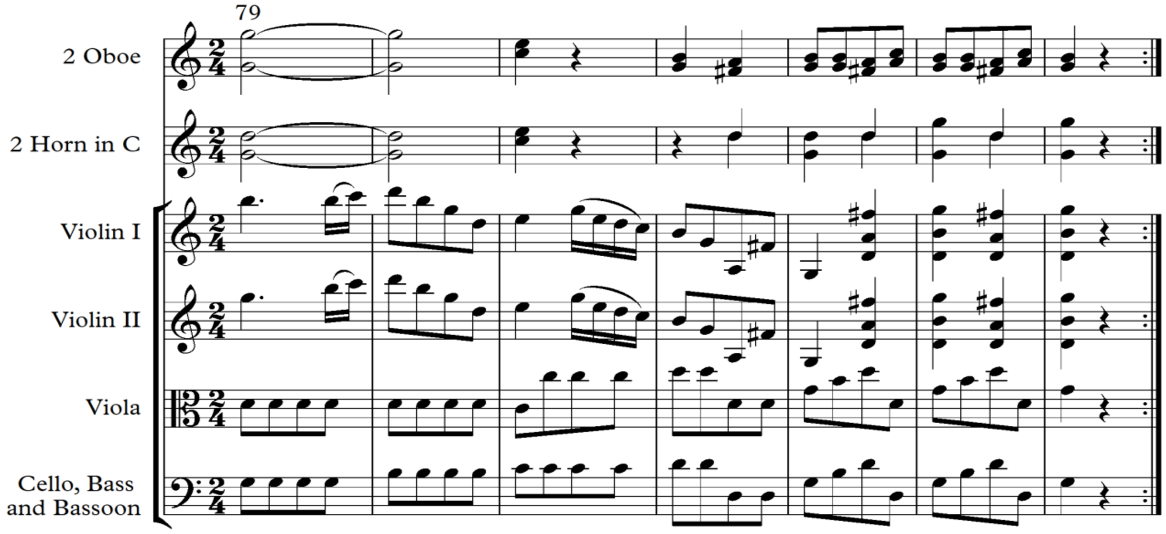
4.2.1 Closing Operation One – Exposition/Recapitulation Repeat

The first method for achieving closure and bringing a movement to a close involves the repetition of the ECM at the end of the recapitulation.[13] In the majority of examples, the repeated material of the exposition is only altered to accommodate the tonality. It should be noted that, in movements which contain CO1, the ECM is, and must be, constructed in a manner which concludes not only the exposition internally, but also the whole movement. This is important, because changes to the ECM, which inhibit the closing material being used to conclude the whole movement as well as the exposition, is one of the reasons for the development and appearance of CO2. Figures 4.1 and 4.2, taken from movements by Haydn and Mozart, provide examples of this type of closing operation. For ease of comparison, and to communicate the similarities between the ECM and the closing material of the recapitulation, two extracts, taken from both sections, are provided for each figure.

[13] As explained in Section 2.4.3 (p. 76), IM = Introduction Material, EFS = Expositional First Subject, ETM = Expositional Transition Material, ESS = Expositional Second Subject, ECM = Expositional Closing Material, DM = Development Material, CM = Cadential Material, TM = Tonic Material, LP = Link Passage, DMM = Different Movement Material.

Figure 4.1 – Presence of CO1 in H/25/1.

i) ECM (bb. 79–85)



ii) closing material of the recapitulation (bb. 181–187)

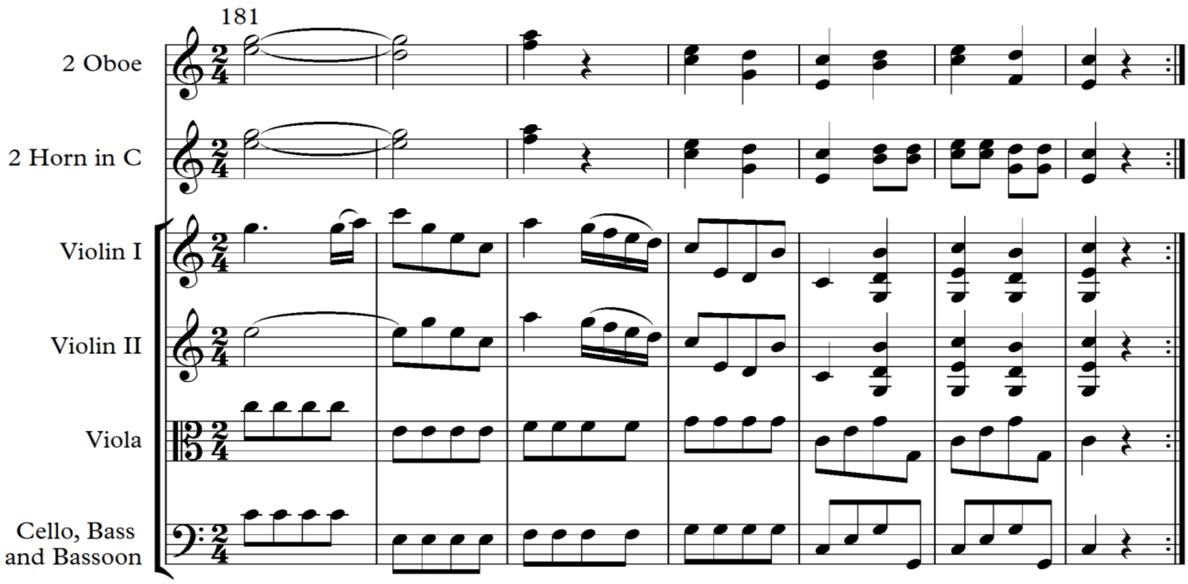


Figure 4.2 – Presence of CO1 in M/48/1.

i) ECM (bb. 28–33)

ii) closing material of the recapitulation (bb. 88–93)

As can be seen in both examples, the closing passage of the exposition is repeated with amendment to accommodate the return to the home key. In examples such as these, the ECM is also satisfactory enough to act as a conclusion for the whole movement. These passages emphasise the tonic and the dominant, containing, especially in H/25/1, a series of emphatic perfect cadences.

This simpler method of movement closure,[14] until the regular use of the coda towards the end of the eighteenth century, appears to be the dominant method used by Haydn and Mozart for concluding a movement, with 70% of the sonata-form movements from works pre-1770 concluded in this fashion. No examples of movements with CO1 are available for Beethoven because by *c.*1787 this method of achieving closure appears to have become redundant and is no longer found in the sample.[15] Table 4.1 lists all the movements from the whole sample by Haydn and Mozart which conclude with CO1. The dates of composition are included in the table to highlight the period of composition in which CO1 is most prominent.[16]

[14] This method of movement closure is labelled as 'simpler' because the movement can be concluded without the need for an additional section.
[15] The last recorded movement containing a CO1 in the sample can be found in M/504/1 and M/504/4 (1786).
[16] In examples where the date of a work is uncertain, for example H/25, the earliest suggested date has been used for chronological placement.

Table 4.1 – List of movements ending with CO1.

Work/ Movement	Composer	Composition Date
1/1	Haydn	1757–1759
1/3	Haydn	1757–1759
37/1	Haydn	1758
37/4	Haydn	1758
4/1	Haydn	1760–1762
5/4	Haydn	1760–1762
25/1	Haydn	1760–1766
32/1	Haydn	1760–1766
32/4	Haydn	1760–1766
33/1	Haydn	1760–1767
11/3	Haydn	1760–1769
6/1	Haydn	1761
8/4	Haydn	1761
107/1	Haydn	1761–1762
2/1	Haydn	1761–1764
10/1	Haydn	1761–1766
10/3	Haydn	1761–1766
27/1	Haydn	1761–1766
3/1	Haydn	1762
9/1	Haydn	1762
14/1	Haydn	1762–1764
17/1	Haydn	1762–1765
19/1	Haydn	1762–1766
20/1	Haydn	1762–1766
12/1	Haydn	1763
12/3	Haydn	1763
13/1	Haydn	1763
40/1	Haydn	1763
21/4	Haydn	1764
22/4	Haydn	1764
23/1	Haydn	1764
24/1	Haydn	1764
16/1	Mozart	1764–1765
19/3	Mozart	1765
108/1	Haydn	1765
108/4	Haydn	1765

Work/ Movement	Composer	Composition Date
28/1	Haydn	1765
28/4	Haydn	1765
29/1	Haydn	1765
29/4	Haydn	1765
30/1	Haydn	1765
19a/1	Mozart	1765–1766
16/1	Haydn	1765–1766
16/3	Haydn	1765–1766
39/1	Haydn	1765–1770
39/4	Haydn	1765–1770
45a/1	Mozart	1766
45a/3	Mozart	1766
43/1	Mozart	1767
43/4	Mozart	1767
35/1	Haydn	1767
58/4	Haydn	1767–1774
45/1	Mozart	1768
45/4	Mozart	1768
45b/4	Mozart	1768
48/1	Mozart	1768
48/4	Mozart	1768
49/1	Haydn	1768
49/4	Haydn	1768
38/1	Haydn	1768–1769
38/4	Haydn	1768–1769
59/1	Haydn	1768–1769
36/1	Haydn	1769
36/4	Haydn	1769
48/1	Haydn	1769
48/4	Haydn	1769
65/1	Haydn	1769–1778
73l/3	Mozart	1770
73n/4	Mozart	1770
75b/1	Mozart	1771
111b/4	Mozart	1771
112/1	Mozart	1771

Work/Mvt	Composer	Composition Date
114/1	Mozart	1771
114/4	Mozart	1771
128/1	Mozart	1772
129/1	Mozart	1772
129/3	Mozart	1772
130/4	Mozart	1772
132/1	Mozart	1772
133/4	Mozart	1772
45/1	Haydn	1772
46/1	Haydn	1772
47/1	Haydn	1772
47/4	Haydn	1772
52/1	Haydn	1772–1774
162/1	Mozart	1773
50/1	Haydn	1773
64/1	Haydn	1773–1778
51/1	Haydn	1774
54/4	Haydn	1774
55/1	Haydn	1774
56/4	Haydn	1774
57/1	Haydn	1774
57/4	Haydn	1774
60/1	Haydn	1774
66/1	Haydn	1775–1779
300a/3	Mozart	1778
71/1	Haydn	1778–1780
53/1	Haydn	1778–1779
63/1	Haydn	1779–1781
63/4	Haydn	1779–1781
62/1	Haydn	1780–1781
62/4	Haydn	1780–1781
79/1	Haydn	1784
81/4	Haydn	1784
87/1	Haydn	1785
504/1	Mozart	1786
504/3	Mozart	1786

4.2.2 Closing Operation Two – Closing Material Expansion

Leichtentritt suggests that for an additional passage to be labelled a coda it must be able to stand independently from the movement to which it is attached (1967, p. 155). It cannot be, as Anger suggests, an expansion or extension of a phrase from the end of the recapitulation (1900, p. 14). Given the organisation of the majority of codas identified by the eight criteria (which are discussed at length in Chapters Five, Six and Seven), I agree with Leichtentritt's view of the coda. However, there are a number of examples, identified by the eight criteria discussed in Chapter Three, which do not conform to the description of CO1 or Leichtentritt's coda. As a result, and in order to categorise all the sonata-form movements in the sample, a third category of closing operation is required.

The label 'Closing Operation Two' (CO2) is applied to works which contain an expansion or extension of the final bars of the movement, but which do not reasonably stand apart from the recapitulation to which it is attached. These additional passages are often constructed using emphatic chords and cadential gestures which serve to reinforce the end of the movement. Figures 4.3 and 4.4, taken from movements by Haydn and Mozart, provide examples of this type of closing operation. The extra bars added to the movement to enhance closure are highlighted in red.

As can be seen from both examples, the passages added to the closing material of the recapitulation are constructed using a selection of sequential patterns, repeated tonic and/or dominant chords and cadences. Rosen's and Scholes' comments, although not applicable to the coda, would be appropriate here for the description of such CO2 passages. These passages serve to 'saturate the ear with the tonic' (Rosen, 2005, p. 394) and 'add a greater sense of finality' (Scholes, 1938, p. 200), than that established in the recapitulation, to the movement. These passages do not stand apart from the movements to which they are attached and therefore should not be labelled as a coda.

Figure 4.3 – Presence of CO_2 in H/14/4 (bb. 59–66).

Figure 4.4 – Presence of CO2 in M/73m/4 (bb. 162–173).

As with CO1, the presence of CO2 predates the coda in the selected sample. The earliest use of this closing operation can be found in H/5/1 which is dated between 1760 and 1762. However, unlike CO1, CO2 can be found in works by Haydn and Mozart after 1786, with the last recorded use in the sample appearing in H/100/1 (1793). As with CO1, by the time of Beethoven's symphonies, CO2 is no longer a method used to create closure. Table 4.2 lists all the movements from the whole sample by Haydn and Mozart which conclude with CO2.

Table 4.2 – List of movements ending with CO2.

Work/ Movement	Composer	Composition Date
5/1	Haydn	1760–1762
11/1	Haydn	1760–1769
33/4	Haydn	1760–1767
6/4	Haydn	1761
7/1	Haydn	1761
7/4	Haydn	1761
8/1	Haydn	1761
2/3	Haydn	1761–1764
27/3	Haydn	1761–1766
14/4	Haydn	1762–1764
20/4	Haydn	1762–1766
19/3	Haydn	1762–1766
72/1	Haydn	1763–1781
22/1	Haydn	1764
24/4	Haydn	1764
22/1	Mozart	1765
31/1	Haydn	1765
19a/3	Mozart	1765–1766
35/4	Haydn	1767
45b/1	Mozart	1768
26/1	Haydn	1768–1770
41/1	Haydn	1768–1770
41/4	Haydn	1768–1770
73/1	Mozart	1769–1770
65/4	Haydn	1769–1778
73l/1	Mozart	1770
73m/1	Mozart	1770
73m/4	Mozart	1770
73q/1	Mozart	1770
73q/3	Mozart	1770
75/1	Mozart	1771
111a/1	Mozart	1771
111b/1	Mozart	1771
42/1	Haydn	1771
124/1	Mozart	1772
130/1	Mozart	1772
43/1	Haydn	1772
161b/1	Mozart	1773
162/3	Mozart	1773
50/4	Haydn	1773
207a/1	Mozart	1775
213a/1	Mozart	1775
61/1	Haydn	1776
70/1	Haydn	1778–1779
319/1	Mozart	1779
319/4	Mozart	1779
74/1	Haydn	1780–1781
74/4	Haydn	1780–1781
73/4	Haydn	1781–1782
385/1	Mozart	1782
76/1	Haydn	1782
78/1	Haydn	1782
80/1	Haydn	1784
80/4	Haydn	1784
85/1	Haydn	1785
551/1	Mozart	1788
94/1	Haydn	1791
95/1	Haydn	1791
100/1	Haydn	1793

Although the movements identified in Table 4.2 do not warrant the term 'coda', it could be speculated that this closing operation could be the precursor for the eventual introduction and dominance of the coda. Not only are both of these closing operations additional passages (CO2 on a smaller scale), ending on the tonic chord, but the use of CO2 predates the coda, phasing out once the coda is introduced.

The appearance of movements concluding with CO2 may not only be a precursor for the introduction of the coda, but may also reflect the changing compositional trends for the ECM. In the case of movements with CO1, the closing material of the exposition is sufficient to function as both the concluding passage, locally, for the exposition, as well as, globally, for the whole movement. However, in a number of CO2 examples, the closing material of the exposition is open ended – sufficient to close the exposition and lead either back to the beginning of the section, or on to the development – but not satisfactory to close the movement, without the addition of further material. As a result, additional bars are required not only to create a greater sense of finality, but to complete what was earlier, the closing material of the exposition. Figure 4.5 provides an example of how the end of the movement receives a small alteration in order to complete the movement and create a greater sense of completion not established in the ECM.

Figure 4.5 – Expansion and extension of the closing material of the exposition to establish a greater sense of closure in H/90/4.

i) ECM (bb. 90–98)

ii) closing material of the recapitulation (bb. 256–266)

In comparison with the methodology employed for the identification of a coda (i.e., the eight criteria; Section 3.1, p. 90), movements which contain CO2 are identifiable solely through the use of criterion two: i.e., the point at which the music of the recapitulation no longer corresponds to that of the exposition (Section 3.1.2, p. 100). These movements retrace the material of the exposition in the recapitulation and then contain an expansion or alteration of the ECM through the use of emphatic chords and cadential gestures. However, there is no return to the material of the development (criterion three), no harmonic interruptions (criterion four), no breaks in rhythmic continuity (criterion six), and no significant changes in texture (criterion seven).

4.2.3 Additional Operation – Closure through Transition

There is an additional operation employed at the end of the movement in the sample by Mozart which could be interpreted as either a further method of closure or as an example of CO2. However, given the main function of this additional method, it does not justify being labelled as either. Although this additional operation appears at the end of the movement and in many cases is sufficient in length (longer than eight bars) and independent enough (identifiable with at least one criterion) from the recapitulation, it does not primarily act to create closure. Rather, through the addition of a further passage, it acts as a *transition* linking one movement to the next, and it could be argued that the addition of these transitional passages are in fact an attempt to avoid creating closure. Given the function of this additional passage, these transitional conclusions are only found in the first movements of the sample. Figure 4.6 provides an example of this form of transitional conclusion found in a work of Mozart. No examples of this concluding transition can be found in the sample of movements by Haydn or Beethoven.[17]

[17] An example of this method of movement closure through transition, although not present in the sample movements, can also be found between the internal movement of the symphonic sample of these composers, for example between B/5/3 and B/5/4.

Figure 4.6 – Presence of a movement-to-movement transition passage at the end of M/141a/1 (M/141a/1 bb. 112–117, M/141a/2 bb. 1–2).

Observation of Figure 4.6 shows that not only do these transition passages not provide a satisfactory conclusion to a movement, they also often fail emphatically to cadence in the tonic of the movement. Rather, these transitional passages sacrifice the emphatic chords and cadential gestures of the first movement's tonic key in order to prepare for the key of the following movement. In Figure 4.6, the first movement finishes on the tonic chord. However, this chord in fact serves as a dominant chord (via the addition of a ♮7) for the key of the next movement (C major).

Given that the coda is described as a conclusion to a movement, 'creating a greater sense of finality' (Scholes, 1938, p. 200), the movements which contain these additional transition passages cannot be described as a method of closure or as a coda. Movements with these transition passages constitute 10% of the first movements in the sample by Mozart. Table 4.3 lists all the movements from the Mozart sample which conclude with a transition passage to the second movement.

Table 4.3 – Movements ending with a transition passage to movement two.

Work/ Movement	Composer	Composition Date
73n/1	Mozart	1770
74/1	Mozart	1770
161a/1	Mozart	1773
162b/1	Mozart	1773
141a/1	Mozart	1773–1774

It is worth briefly mentioning that the movements identified in Table 4.3 all contain three movements and it could be, that these works are in fact a reflection of 'the "Italian" overture-symphony rather than the "Austrian" concert-symphony' (Zaslaw, 1989, p. 98).[18] This would explain the identified first to second movement transitions found in these movements. CTT would therefore be a method of closure associated with the "Italian" overture-symphony not the "Austrian" concert-symphony.

[18] M/74 which bears no title or date is also labelled, although subsequently crossed out, as the 'Ouverture (zur Oper *Mitridate*)' (Zaslaw, 1989, p. 178).

4.2.4 Closing Operation Three – Coda

Based on the descriptions of CO1, CO2, and CTT, it is possible to deduce the following initial statements regarding the coda. From the description of CO1, it can be noted simply that the coda *is an additional passage added onto the end of the recapitulation*. It is not an extension to, or expansion of the recapitulation, because the recapitulation has the ability to create movement closure without any additional material. The coda is the final section in a sonata-form movement; thus nothing follows the coda. CO2's description further supports the hypothesis that the *coda should be an independent section*, whilst also highlighting – given that CO2 is identifiable using one criterion – that the coda should be identifiable using a minimum of two of the eight criteria from Chapter Three.

Studying the lengths of the movements with CO2 and movements with a coda it is possible to identify the minimal length of the coda with regard to this sample. The smallest length that a coda can be for the sample is eight bars (e.g., H/71/4).[19] This is supported by Leichtentritt, who states that 'eight or sixteen measures generally suffice for the coda' (1967, p. 54). Interestingly, although Leichtentritt's minimal value for the length of the coda matches the data extrapolated from the sample, Haydn, Mozart and Beethoven clearly demonstrate, in a number of examples that the upper value of 16 bars *does not suffice* in length for the coda. The largest codas for each of these composers are 88, 68 and 236 bars, respectively.[20] A movement containing an additional section of fewer than eight bars is most likely an example of a movement with CO2 rather than a coda. Finally, from studying the small sample of movements which contain CTT, *for an additional passage to be labelled as a coda, it must end on the tonic.*

[19] Only one exception to this rule exists in the sample: H/107/3. The coda from this movement, which measures seven bars in length, is included in the sample as the additional section can be identified using three criteria.

[20] The largest codas can be found in H/97/4, M/551/4, and B/8/4. Interestingly, the codas from H/97/4 and B/8/4 are located in sonata-rondo movements. This could indicate that codas in sonata-rondo movements are generally longer than those in sonata-allegro movements. This hypothesis is supported by Reicha, who suggests that the final two sections of the sonata-rondo (not including the coda) are the longest and most important (cited in Cole, 1969, p. 185).

4.2.5 Numerical Survey of Employed Operations of Closure

With the data collected regarding the different types of closure employed in the sample, it is possible to analyse and compare the frequency of the closing operations and their changing application over the 60-year period of composition. Figures 4.7, 4.8 and 4.9 show the proportion of closing operations employed in the sample of movements by Haydn and Mozart. The percentages for the ‘not included in sample’ category represent the movements not in sonata-allegro or sonata-rondo form, and therefore not included in the coda sample under investigation.

Figure 4.7 – Proportion of closing operations found in the sample of first and final movements by Haydn.

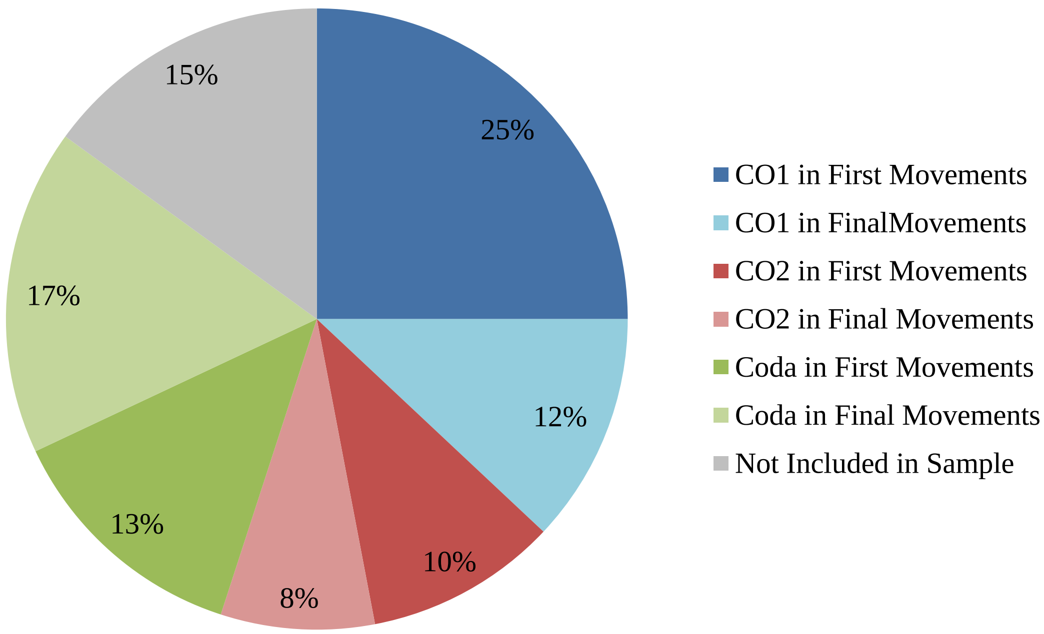


Figure 4.8 – Proportion of closing operations found in the sample of first and final movements by Mozart.

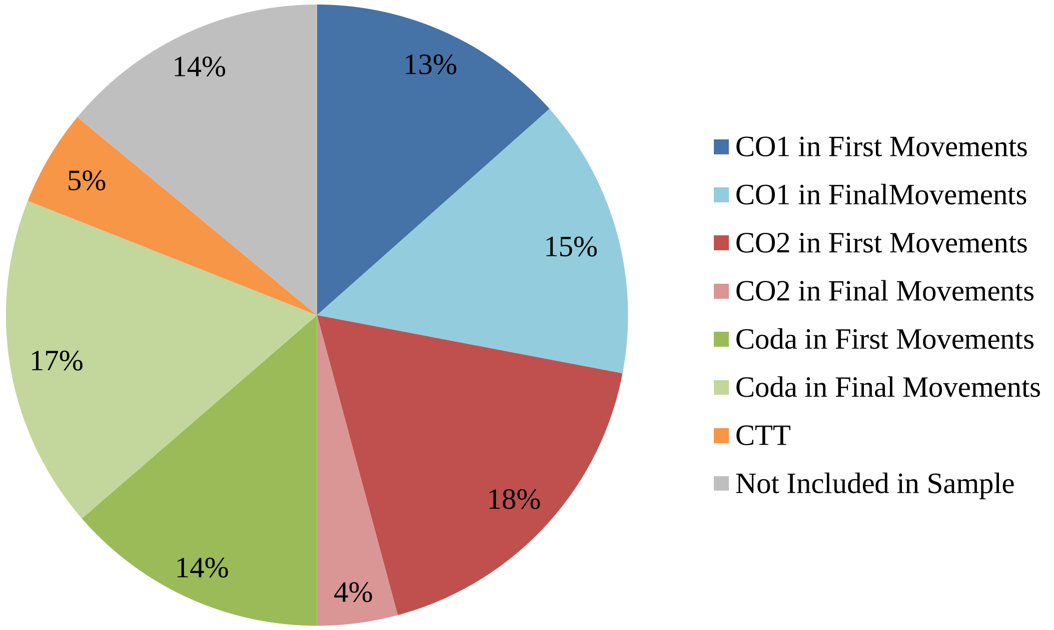
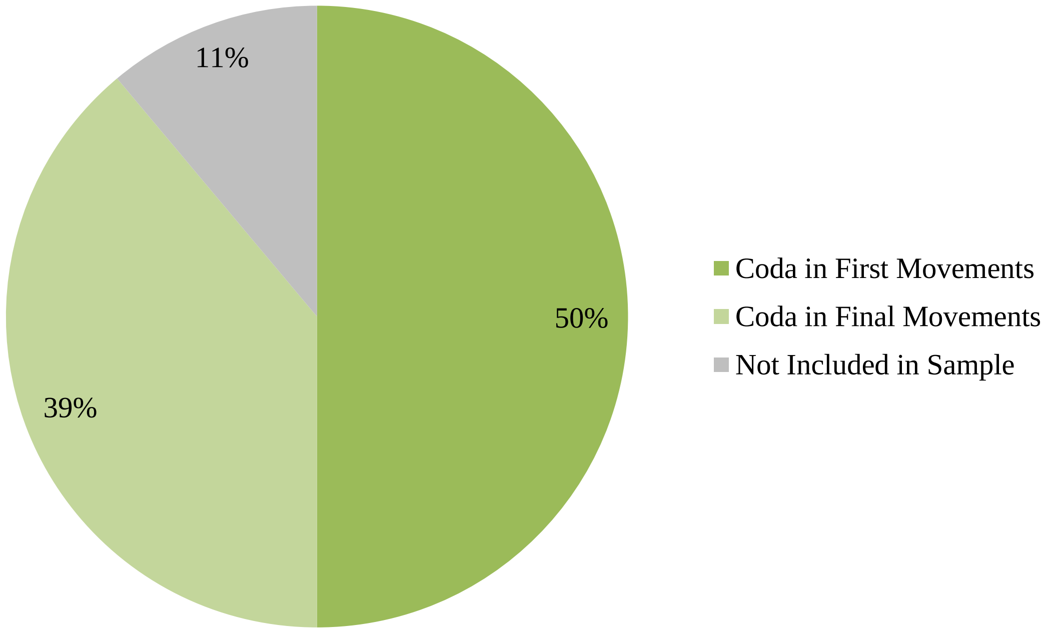


Figure 4.9 – Proportion of closing operations found in the sample of first and final movements by Beethoven.



It would appear, from studying Figures 4.7 and 4.8, that the application of CO1, CO2 and the coda in the sample movements by Haydn and Mozart is very similar, with the most recognisable difference being the proportion of CO1 (nine percentage-points) and the presence of CTT in 5% of Mozart's movements. In comparison with Haydn and Mozart, the data collected regarding the proportion of closing operations in the sample of Beethoven's first and final movements clearly shows that, for Beethoven, the coda was the principal method for movement closure. If one looks more specifically at which movements contain these varying closing operations, then we find a number of further similarities, and some differences, between the deployment of CO1, CO2 and the coda in the movements by Haydn and Mozart.

From observation of Figure 4.9, it is clear that, for Beethoven, the use of the coda is a constant for both the first and the final movements of the sample. However, for Haydn and Mozart, a range of closing operations is employed in both the first and final movements. For Haydn, the varying closing operations are relatively evenly spread, with the largest proportional split being found between the applications of CO1 (13 percentage-points) in the first and final movements. For Mozart, a significant difference can be seen between the application of CO2 in the first and final movements: 18% of first movements have CO2. It would appear that, for final movements, Mozart tended to achieve closure by ending the movement with either a repeat of the ECM or the addition of a coda.

Interestingly, for both Haydn and Mozart the largest proportion of codas can be found in the final movements. This is perhaps to be expected, for if a coda functions to bring a movement to a close, no greater is closure required than in the last movement of a symphonic work. Unfortunately, although the proportion of final movements containing a coda is higher than the proportion of first movements, the percentage-point difference is not particularly significant (mean: ten percentage-points), and it is not possible to draw any significant conclusions regarding this split. However, the presence of codas in both the first and final movements does support the decision discussed in Section 2.1.2 (p. 60) to study the coda in both the first and final movements. Clearly the coda was not a structural device principally associated with only one movement. The question we are now left with concerns the organisation and function of the coda in these two movements. Namely, is the coda constructed and does it function in the same format regardless of which movement it is associated with? This question will be discussed in greater detail in Chapters Five, Six and Seven.

Although this chapter has established the proportional spread of closing operations in the sample movements, it has not identified whether or not the use of the varying closing operations is random or systematic (i.e., is there a changing trend present across the 60-year sample and/or is there an identifiable breakdown for how closure was achieved at different points during this period?). Smyth states that the works of Haydn and Mozart 'represent a pinnacle in the development of stylistic formal closure' (1985, p. 1). If this statement is true, a chronological placement of all the movements containing CO1, CO2 and a coda may reveal a positive trendline from movements containing CO1 to movements containing a coda. Figures 4.10, 4.11, 4.12 and 4.13 show the chronological placement (with decade-ticks) of the closing operations employed in the first and final movements by Haydn and Mozart.

Figure 4.10 – Chronological placement of closing operations employed in the first movement of Haydn's symphonies.

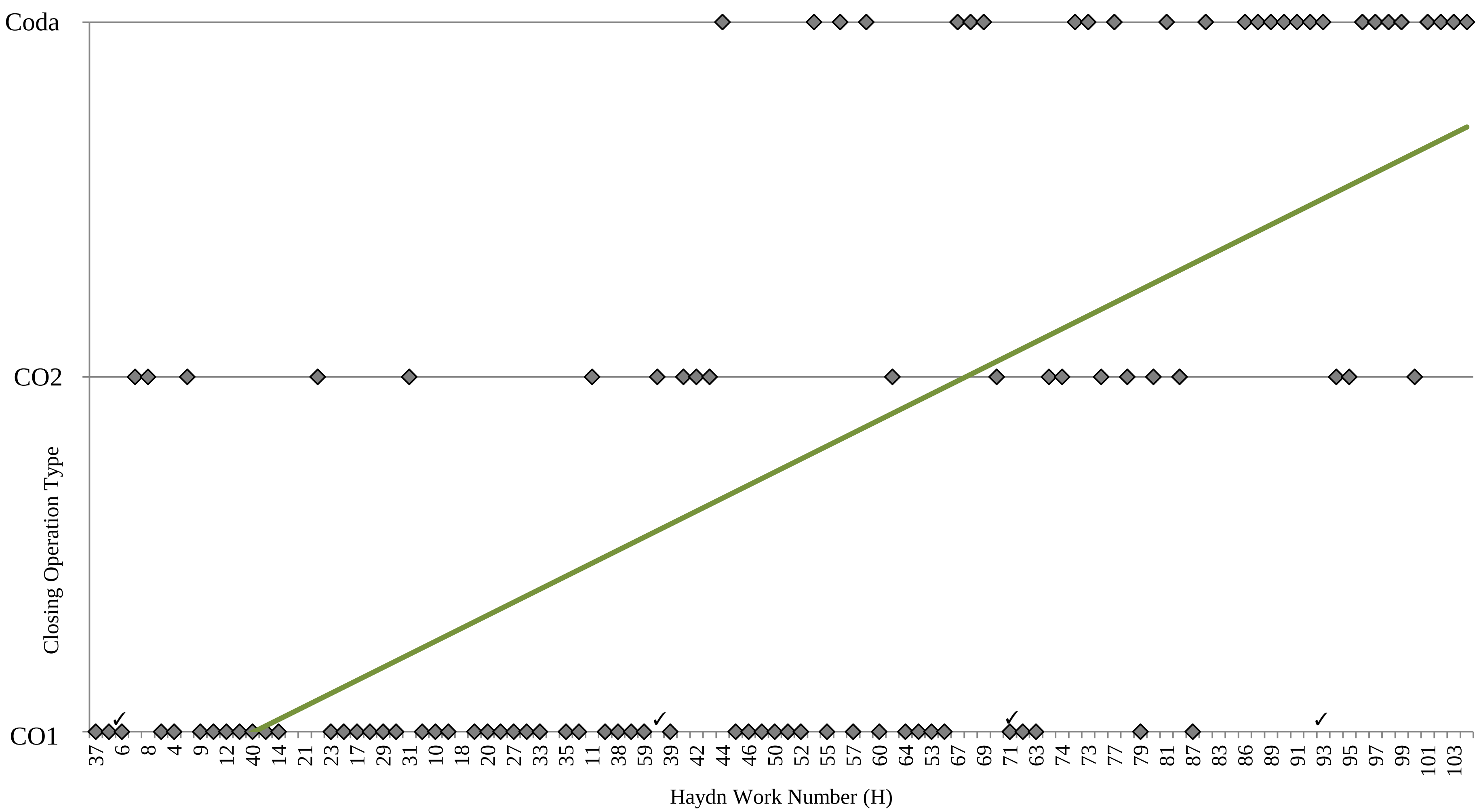


Figure 4.11 – Chronological placement of closing operations employed in the final movement of Haydn's symphonies.

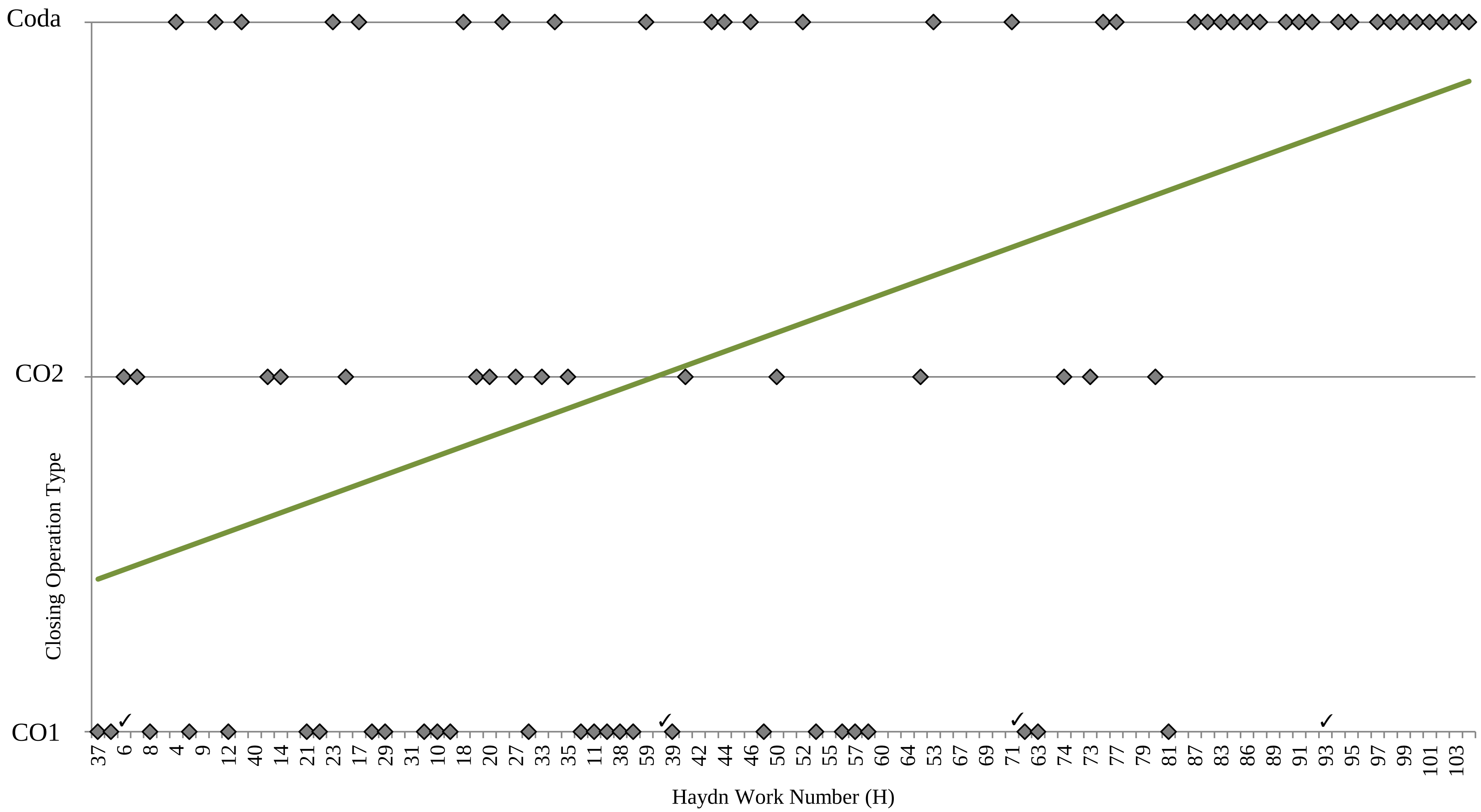


Figure 4.12 – Chronological placement of closing operations employed in the first movement of Mozart's symphonies.

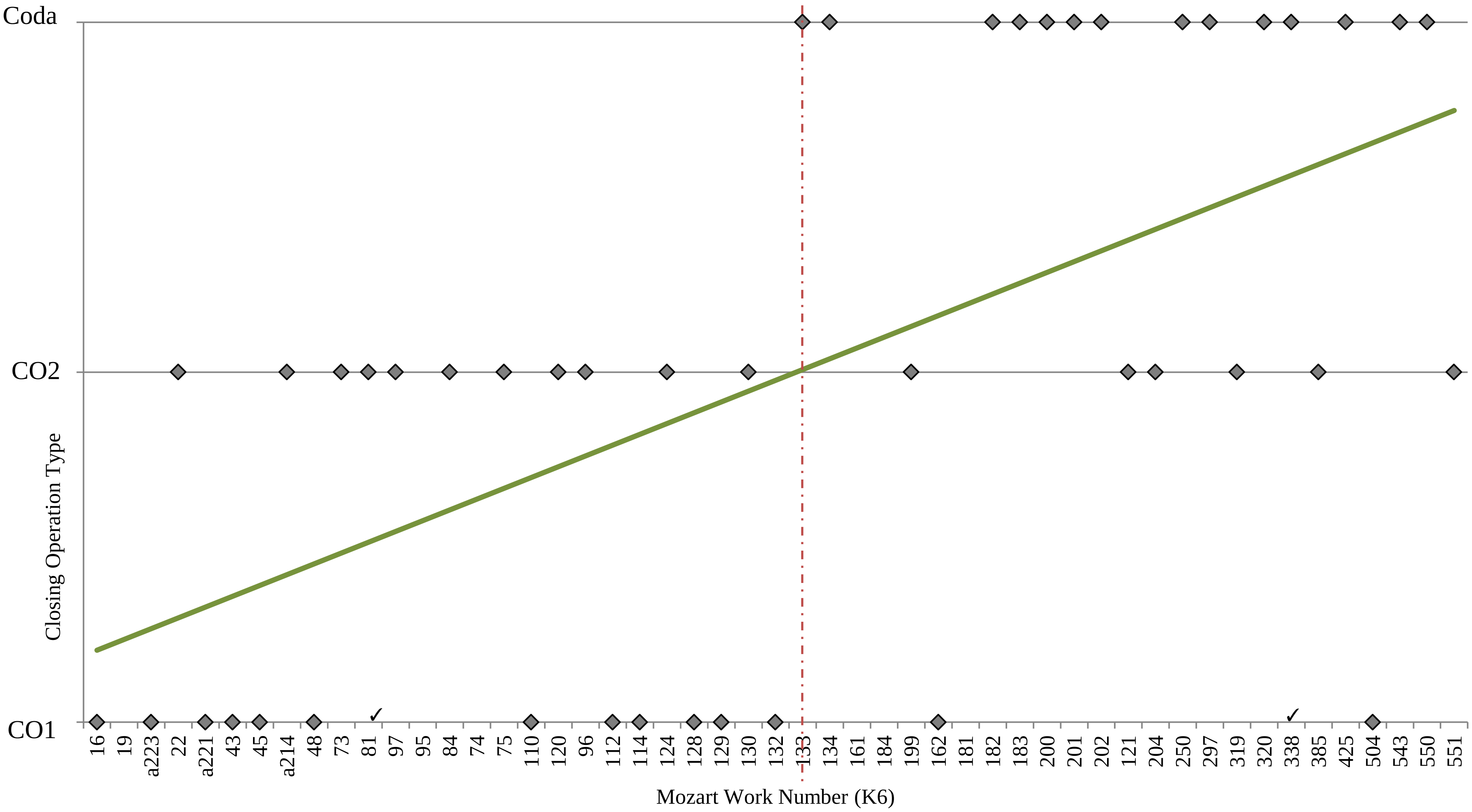
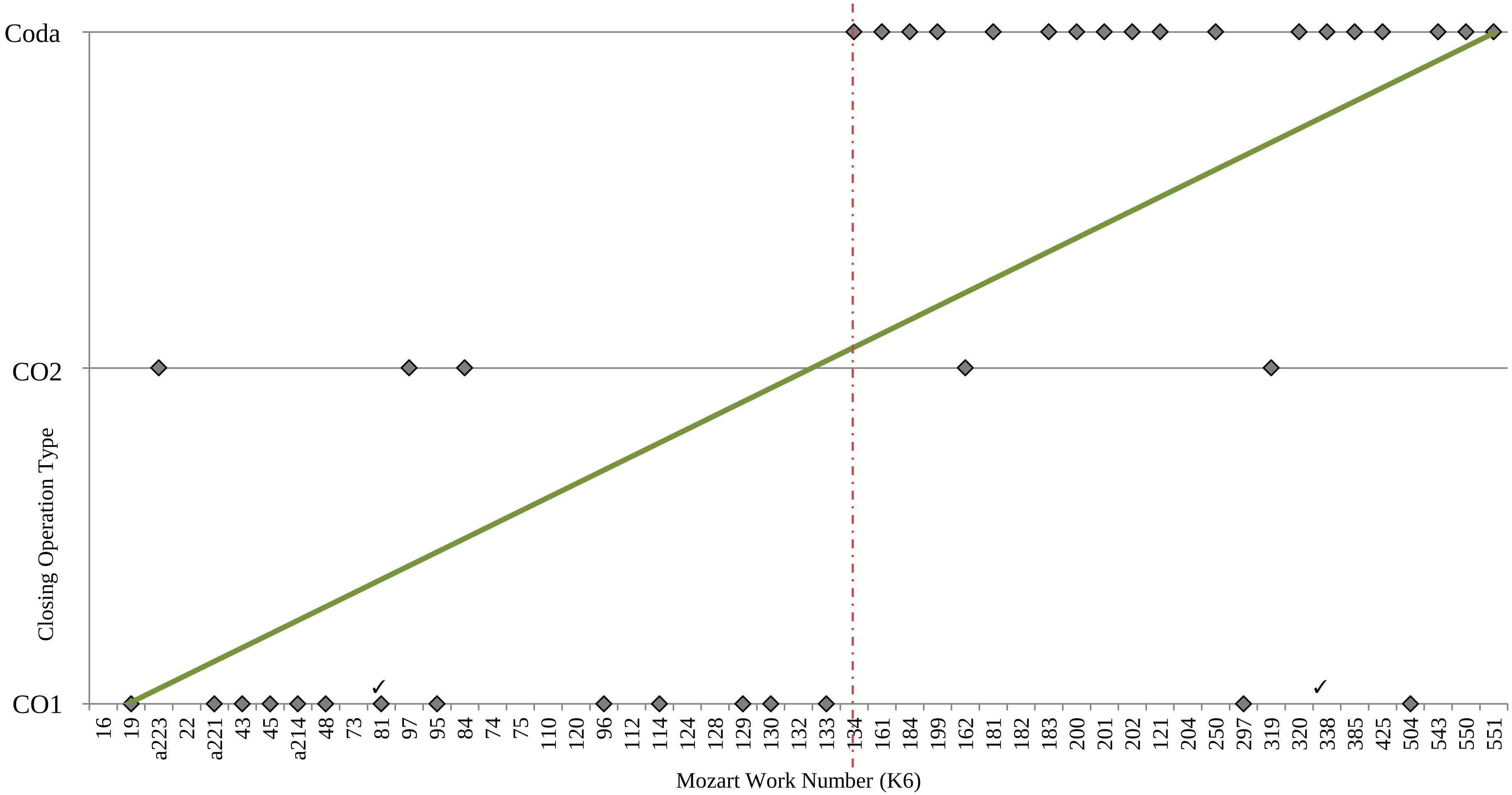


Figure 4.13 – Chronological placement of closing operations employed in the final movement of Mozart's symphonies.



As Figures 4.10, 4.11, 4.12 and 4.13 show, there is a gradual progression throughout the two samples from movements containing CO1 through to movements containing a coda in both the first and final movements. For both Haydn and Mozart, CO2 appears to be present throughout the sample, although its frequency is reduced at points of dense deployment of the coda (often towards the end of the composer's compositional output). With regard to Mozart, Figure 4.13 reinforces the observations of Figure 4.8, which identified the limited application of CO2 to the final movement. Furthermore for Mozart, with the exception of the four movements with CO1 post 1772 (M/162/1, M/297/4, M/501/1 and M/504/4), there is clear divide between the movements which close with CO1 and movements which close with a coda. The vertical red dashed line highlights this divide in the two movement samples. This transference for Mozart's works appears to occur in 1772 for both the first and final movements.

For Haydn's first movements we see a similar transition from CO1 to the coda. However, there appears to be a more gradual transference between these two closing operations. As with Mozart, the earliest first-movement coda appears as early as 1772 (H/44). However, it is not until 1780 that the frequency of the coda becomes more dominant than that of CO1. Furthermore, in comparison with the first movements and the movements by Mozart, there is a less clear divide between CO1 and the coda in the final movements of Haydn's symphonies. Although, with one exception (H/81/4), the coda becomes the dominant method for closure after 1780, there is a greater overlap between these closing operations. There are 14 final movements by Haydn containing a coda prior to 1780, with the earliest coda in a final movement dated between 1760 and 1762 (i.e., H/4).[21]

These data could suggest that Haydn experimented more with concepts of closure and that the codas prior to 1780 are products of this experimentation and development. One only need hear the coda from H/4/3 to understand the simplicity of Haydn's earlier codas. Future

[21] The symphonies containing a final-movement coda prior to 1780 include: H/4, H/107, H/13, H/23, H/17, H/18, H/25, H/34, H59, H/43, H/44, H/46, H/52 and H/53.

study of these 14 codas, prior to 1780, may further illuminate the development of the coda from its introduction to its dominance as the primary form of movement closure. If nothing else, the data presented in Figures 4.12 and 4.13 suggests that Haydn used the coda in the final movements of his symphonic works approximately ten years before he incorporated it into the first movement. It could be speculated that Haydn initially viewed the coda not as a method of movement closure but as a method of work closure.

Although there are some differences with regard to the distribution of the varying closing operations, Figures 4.10, 4.11, 4.12 and 4.13 do support Smyth's statement. There is clearly a recognisable period of development in the coda in the works of Haydn and Mozart. During the 38-year period of symphonic composition, the method in which a movement achieves closure appears to change significantly, shifting from the use of repeated ECM, through the introduction of small additional passages comprising emphatic chords and cadences, to the addition of a coda. Whether or not these samples of works 'represent a pinnacle in coda development' (1985, p. 1) cannot, without studying a range of contemporaries of Haydn and Mozart (which is not the aim of this thesis, nor was it Smyth's), be supported or justified. Beethoven's symphonies appear to provide a plateau of development for the coda with all his symphonic sonata-form first and final movements containing an additional coda passage. Although not mutually exclusive, it is from this point that it could be speculated that the coda no longer develops externally (as an experimental additional passage), but the focus switches to more internal changes and development.

4.3 Initiating the Coda

Not only did the application of the eight criteria (Chapter Three) identify the starting bar of the coda in movements which contain this section, but the criteria also allowed for observations to be made regarding how the coda is connected to the end of the recapitulation. By comparing the hypothesised starting bars of the coda according to the three most commonly applicable criteria, criterion two (Section 3.1.2, p. 100) – the point at which the music of the recapitulation no longer corresponds to that of the exposition – criterion six (Section 3.1.6, p. 115) – a break in the rhythmic continuity of the music – and criterion seven (Section 3.1.7, p. 125) – the point at which there is a significant change in texture – it is possible to identify three primary methods by which the coda is connected to the recapitulation. These three methods of parataxis are labelled as 'defined', 'continuous' and 'elided'. The following section details these methods of parataxis, providing examples from each composer in the sample, explaining how they are identifiable using the eight criteria from Chapter Three, and identifying the frequency of each form of integration in the three samples.

4.3.1 'Defined' Coda

The connection between the recapitulation and the coda is marked as 'defined' when at the end of the recapitulation, and having finished repeating the material of the exposition (criterion two), there is a clear break in the music before the coda begins. This break is frequently marked by a rhythmic interruption (criterion six) and/or a textural change (criterion seven). In a number of examples this defined break is also identifiable by the presence of a development-recapitulation repeat barline and/or the term 'coda' (criterion one). With regard to the positioning of criteria, a 'defined' coda is identifiable in movements where the bar number identified by criterion six and/or seven aligns with that established by criterion two. Given the clear break between sections, the beginning of a 'defined' coda is often the easiest to identify both aurally and visually (from the score). Figures 4.14, 4.15 and 4.16 provide examples of the 'defined' recapitulation-coda parataxis in movements by Haydn, Mozart and Beethoven. The red line marks the beginning of the coda as identified by the listed criteria.

Figure 4.14 – 'Defined' parataxis of the coda at the end of the recapitulation in H/107/1 (bb. 63–69).

Figure 4.15 – 'Defined' parataxis of the coda at the end of the recapitulation in M/183/1 (bb. 197–205).

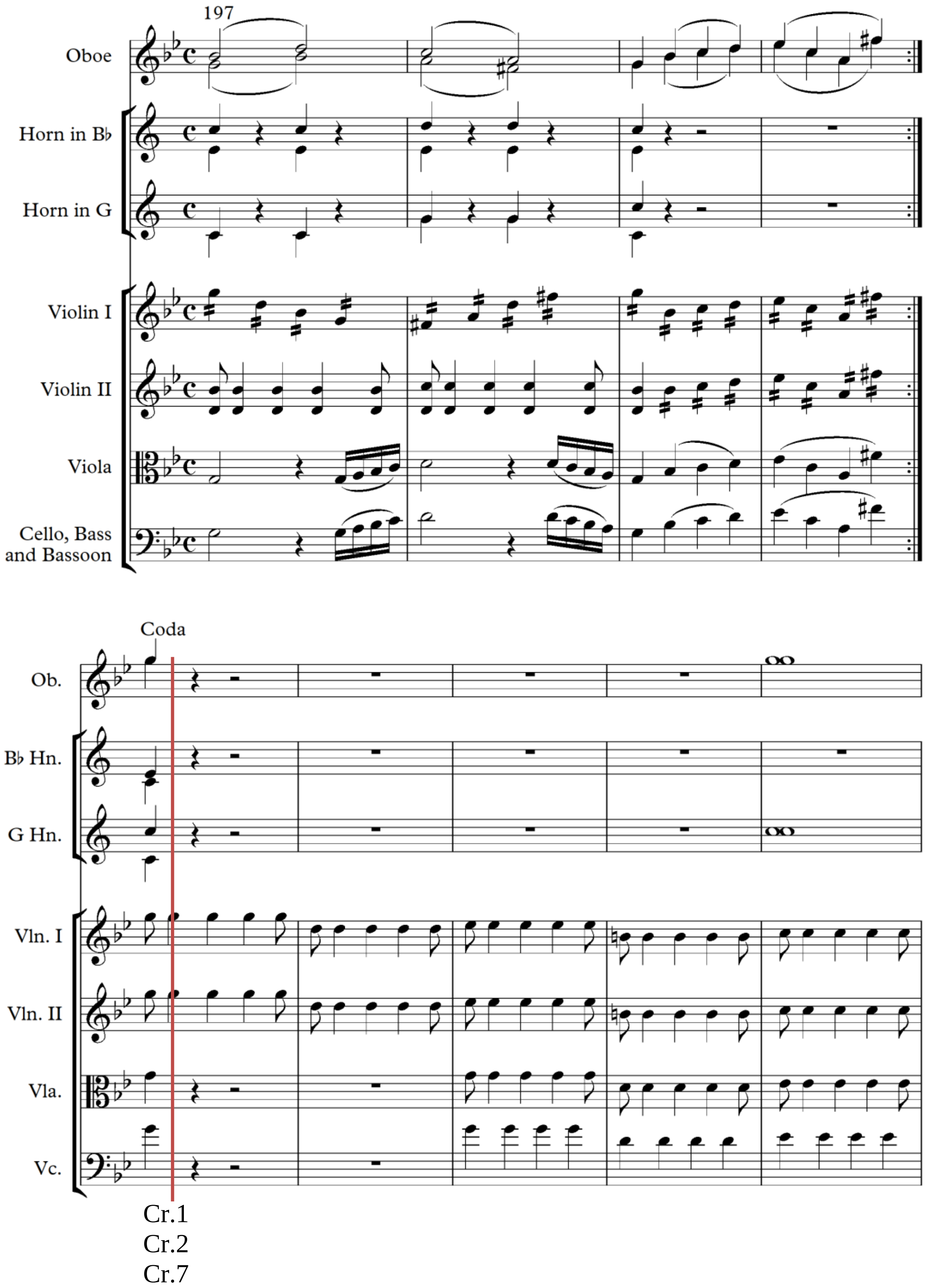


Figure 4.16 – 'Defined' parataxis of the coda at the end of the recapitulation in B/1/1 (bb. 255–262).


Fl.
Ob.
Cl.
Bsn.
C Hn.
C Tpt.
Timp.
Vln. I
Vln. II
Vla.
Vc.
p
Cr.2
Cr.6
Cr.7

As can be seen from the three examples, the different combinations of criteria one, two, six and seven agree on the same starting bar for each of the codas. A coda is labelled as 'defined' when criteria one, two, six and seven agree on the same starting bar. Even without highlighting the starting bar in the three examples, it is relatively easy visually (on the score) to identify where the coda begins. Furthermore, given the nature of criteria six and seven, this 'defined' parataxis is also identifiable aurally. In the examples by Haydn and Beethoven, with the exception of the oboe in B/1/1, there is a clear rhythmic break (created through the use of silence) between the end of the recapitulation and the beginning of the coda. For both Mozart and Beethoven there is a significant textural change clearly marking the beginning of the coda, and for the examples from Haydn and Mozart they are further emphasised by the presence of the double barline repeat.

The concept of a 'defined' parataxis between the recapitulation and coda, identified by the unanimous positioning of criteria one, two, six and seven can be found in an average of 52% of the codas included in the sample (Haydn: 51%, Mozart: 56%, Beethoven: 50%), with an average of 60% of these located in the final movements (Haydn: 66%, Mozart: 53%, Beethoven: 50%). It would appear from these figures that, other than being the most common method of recapitulation-coda parataxis, no other patterns exist for the presence of a 'defined' coda in the sample. 'Defined' codas appear in movements by all three composers, with a higher proportion found, on average, in the final movements. In addition, they appear throughout the three samples with no apparent trend visible. Table 4.4 provides a list of all the 'defined' codas in the sample.

Table 4.4 – 'Defined' codas from the sample of codas identified in the symphonies of Haydn, Mozart and Beethoven.

Work/ Movement	Composer	Composition Date
25/3	Haydn	1760–1766
107/3	Haydn	1761–1762
13/4	Haydn	1763
23/4	Haydn	1764
59/4	Haydn	1768–69
134/1	Mozart	1772
134/4	Mozart	1772
43/4	Haydn	1772
44/1	Haydn	1772
44/4	Haydn	1772
46/4	Haydn	1772
52/4	Haydn	1772–1774
199/3	Mozart	1773
181/3	Mozart	1773
182/1	Mozart	1773
183/1	Mozart	1773
183/4	Mozart	1773
200/1	Mozart	1773–1774
200/4	Mozart	1773–1774
201/1	Mozart	1774
201/4	Mozart	1774
202/1	Mozart	1774
202/4	Mozart	1774
67/1	Haydn	1775–1779
250/1	Mozart	1776
250/4	Mozart	1776
53/4a	Haydn	1778–1779
71/4	Haydn	1778–1780
75/1	Haydn	1779–1781

Work/ Movement	Composer	Composition Date
338/1	Mozart	1780
385/4	Mozart	1782
77/1	Haydn	1782
88/4	Haydn	1787
90/1	Haydn	1788
90/4	Haydn	1788
92/1	Haydn	1789
92/4	Haydn	1789
94/4	Haydn	1791
96/1	Haydn	1791
97/1	Haydn	1792
97/4	Haydn	1792
98/1	Haydn	1792
98/4	Haydn	1792
101/1	Haydn	1793
102/4	Haydn	1794
103/1	Haydn	1795
103/4a	Haydn	1795
103/4b	Haydn	1795
104/4	Haydn	1795
1/1	Beethoven	1800
1/4	Beethoven	1800
2/1	Beethoven	1803
2/4	Beethoven	1803
7/1	Beethoven	1813
7/4	Beethoven	1813
8/1	Beethoven	1814
8/4	Beethoven	1814

The concept of a 'defined' recapitulation-coda parataxis overlaps with Cavett-Dunsby's concept of 'formal codas' (1988, p. 32). These codas, like the 'defined' coda, are clearly identifiable, appearing 'after double barlines and repeat marks towards the end of the movement' (1988, p. 32). As a result, the method for identifying 'formal codas' has close links with the use of criterion one (Section 3.1.1, p. 94): the coda is identifiable by the presence of a development-recapitulation repeat barline and/or the term 'coda'. However, unlike a 'defined' coda, Cavett-Dunsby's method for identifying 'formal codas' does not recognise codas in movements which, although being clearly identifiable, do not contain a double barline and/or repeat marks at the end of the recapitulation. In the example of B/1/1 (Figure 4.16), because there is no double barline present, Cavett-Dunsby's methodology would not recognise this section as a 'formal coda', even though it exhibits a number of the same traits (i.e., recapitulation finishes retracing the material of the exposition, reduction in texture, emphatic cadence, and break in the rhythmic continuity) found in H/107/1 (Figure 4.14) and M/183/1 (Figure 4.15).

4.3.2 'Continuous' Coda

A coda is described as 'continuous' when there is no break between the end of the recapitulation and the beginning of the coda. Often the repeat of the exposition material is interrupted and unfinished when the coda begins. It is important to note that, as with the 'defined' codas, the recapitulation and coda in a 'continuous' coda are two separate sections: there is no merging or cross-over; the recapitulation ends and the coda begins. The difference is that, unlike a 'defined' coda, the 'continuous' coda will begin before the recapitulation has finished tracing the material of the exposition – before it has come to a satisfactory close – and will not be clearly marked by a break in the rhythmic continuity (criterion six) or a significant change in texture (criterion seven). In examples of 'continuous' codas, where the development-recapitulation is repeated, the coda section will also form part of this repeat (e.g., M/133/1 and H/58/1). Figures 4.17, 4.18 and 4.19 provide examples of the 'continuous' coda. As with the examples of the 'defined' coda, the start of the coda in these examples has been highlighted, along with the criteria used to identify it.

Figure 4.17 – 'Continuous' parataxis of the coda at the end of the recapitulation in H/58/1 (bb. 131–137).

Figure 4.18 – 'Continuous' parataxis of the coda at the end of the recapitulation in M/320/1 (bb. 247–253).

Figure 4.19 – 'Continuous' parataxis of the coda at the end of the recapitulation in B/5/1 (bb. 370–377).

Unlike the 'defined' recapitulation-coda parataxis, the most noticeable aspect about the three 'continuous' coda examples is the lack of criteria one, six and seven. In the majority of examples containing a 'continuous' coda, the coda is identified principally by criterion two – the moment when the music of the recapitulation no longer corresponds to that of the exposition – and is supported by a majority of the remaining criteria (criteria three, four, five and eight). Given the lack of criteria one, six and seven as indicators of the coda, 'continuous' codas are more difficult to identify, both aurally and visually. This method of integration also reinforces the need for numerous criteria, for without them, not only would this second type of connection between the recapitulation and coda be missed, but the coda itself may, ipso facto, not even be recognised in the initial 333-movement sample. Table 4.5 shows all the movements by Haydn, Mozart and Beethoven which contain a 'continuous' link between the recapitulation and coda.

In comparison with the number of 'defined' codas, there is a smaller number of 'continuous' codas present in the three samples. 'Continuous' codas average 33% of the total sample (Haydn: 32%, Mozart: 22%, Beethoven: 44%). For Beethoven, the use of 'continuous' codas almost equals the use of 'defined' codas, with only a six percentage-point difference (equivalent to one movement). However, for Haydn and Mozart, the percentage difference is much greater (Haydn: 19 percentage-points, Mozart: 34 percentage-points). Of the movements which contain a 'continuous' coda, 56% appear in the final movements. Again, no pattern appears to be evident for the application of 'continuous' codas in the sample. 'Continuous' codas appear in movements by all three composers and in broadly equal proportion across first and final movements.

Table 4.5 – 'Continuous' codas from the sample of codas identified in the symphonies of Haydn, Mozart and Beethoven.

Work/ Movement	Composer	Composition Date
4/3	Haydn	1760–1762
17/3	Haydn	1762–1765
18/3	Haydn	1762–1766
34/4	Haydn	1765–1767
58/1	Haydn	1767–1774
133/1	Mozart	1772
184/3	Mozart	1773
161/3	Mozart	1773–1774
54/1	Haydn	1774
121/3	Mozart	1774–1775
69/1	Haydn	1775–1779
320/1	Mozart	1779
320/3	Mozart	1779
338/3	Mozart	1780
73/1	Haydn	1781–1782
77/4	Haydn	1782
81/1	Haydn	1784
87/4	Haydn	1785
84/4	Haydn	1786
86/4	Haydn	1786
88/1	Haydn	1787
89/1	Haydn	1787
91/1	Haydn	1788
95/4	Haydn	1791
99/1	Haydn	1793
99/4	Haydn	1793
100/4	Haydn	1793
3/1	Beethoven	1805
4/4	Beethoven	1807
5/1	Beethoven	1808
5/4	Beethoven	1808
6/1	Beethoven	1808
6/4	Beethoven	1808
9/1	Beethoven	1824

4.3.3 'Elided' Coda

The final method of recapitulation-coda integration involves the coda beginning with the closing material of the recapitulation (the repeated ECM). The 'elided' coda is a hybrid of both the 'defined' and 'continuous' coda. In examples including an 'elided' coda, the coda begins at a point during the closing material of the recapitulation. However, the 'true' coda (the point at which different 'coda' material is presented) will begin later. An 'elided' coda is different from a 'continuous' coda in that, firstly, a defined break is present during, or at the beginning, of the recapitulation closing material and, secondly, that in a number of examples, the coda is based on, or continues, the closing material of the recapitulation. In 'elided' codas the two sections are merged together, with the coda growing organically out of the closing material of the recapitulation. Similar to a defined coda, there will be a marked beginning to an elided coda, either through a break in the rhythmic continuity and/or a significant textural change. However, unlike a defined coda, this clear divide does not occur at the end of the re-capitulation identified by criterion two. Figures 4.20, 4.21 and 4.22 show three examples of 'elided' codas. For these examples, the start of the coda is marked in red and the start of the coda identified by criterion two is marked in blue.

Figure 4.20 – ‘Elided’ parataxis of the coda at the end of the recapitulation in H/101/4 (bb. 249–261).

Figure 4.21 – 'Elided' parataxis of the coda at the end of the recapitulation in M/550/1 (bb. 274–283).

Figure 4.22 – ‘Elided’ parataxis of the coda at the end of the recapitulation in B/4/1 (bb. 447–464).

As can be seen from the three examples, criteria two, six and seven identify different starting points for the coda. The beginning or a section of the closing material of the recapitulation is clearly defined by the presence of a break in the rhythmic continuity (criterion six) and/or a textural change (criterion seven). These examples are not defined codas, because the bars identified by criteria two, six and seven do not align. Nor are they continuous codas, because criteria six and/or seven can be applied. An 'elided' coda is identifiable by the positioning of these criteria: in an 'elided' coda, criterion two, and any other supporting criteria, identify the starting bar of the coda *after* the bar identified by criteria six and seven.

The proportion of 'elided' codas in the sample is the smallest of the three methods of recapitulation-coda parataxis. Only one example was identified in the movements by Beethoven (6% of Beethoven's coda sample), eleven for Haydn (17% of Haydn's coda sample) and seven for Mozart (22% of Mozart's coda sample). Of the movements which contain 'elided' codas, an average of 56% of these appear in the first movement of works by Haydn and Mozart, with the only example found in Beethoven's symphonic works also appearing in a first movement. As with the defined and continuous codas, no trends exist (e.g., an increase in the use of elided coda over time) regarding the application of the 'elided' coda in the sample composers' first and final movements. Table 4.6 provides a list of all the 'elided' codas in the sample.

Table 4.6 – 'Elided' codas from the sample of codas identified in the symphonies of Haydn, Mozart and Beethoven.

Work/ Movement	Composer	Composition Date
56/1	Haydn	1774
297/1	Mozart	1778
76/4	Haydn	1782
425/1	Mozart	1783
425/4	Mozart	1783
82/1	Haydn	1786
82/4	Haydn	1786
83/4	Haydn	1786
86/1	Haydn	1786
543/1	Mozart	1788
543/4	Mozart	1788
550/1	Mozart	1788
550/4	Mozart	1788
91/4	Haydn	1788
93/1	Haydn	1791
101/4	Haydn	1793
102/1	Haydn	1794
104/1	Haydn	1795
4/1	Beethoven	1806

4.4 Summary

Chapter Four has highlighted three primary and one additional methods of closure in the first and final symphonic movements by Haydn, Mozart and Beethoven. These include:

- Movements which end with a repeat of material of the ECM (CO1).
- Movements which end with a slight expansion of the repeated ECM (CO2).
- Movements which end with a transition passage leading directly into the next movement (CTT).
- Movements which contain an independent additional passage (CO3/coda).

By ordering these different methods of closure into chronological order it has been possible to identify a changing trend in their application over the 60-year period of study. Pre-1770, CO1 is the dominant form of closure present in the symphonic sample. However, post-1770 this weighting changes with the coda becoming the more dominant method of closure. By the time of Beethoven's symphonies, CO1 and CO2 have disappeared and the coda has become the sole method for concluding a symphonic first and final movement.

Not only have the eight criteria established in Chapter Three allowed for the identification of the codas in the symphonic sample, but the application of certain criteria and their relative positioning has allowed for observations to be made regarding how the coda is connected to the recapitulation. This investigation has identified three methods of recapitulation-coda parataxis:

- Codas which are clearly defined by a break in rhythmic continuity, changes in texture and double barlines.
- Codas which begin, without a clear visual or aural cue, at the end of the recapitulation.
- Codas which are elided with closing material from the recapitulation.

Unlike the changes in closing operations, there appears to be no trend present for the integration of the coda into the recapitulation. However, it is noted that the 'defined' coda is the most prominent type in all three samples, closely followed by the ‘continuous’ coda. Further study of the different forms of recapitulation-coda parataxis in comparison with the ECM and its link with the development may illuminate possible compositional and functional reasons for the use of these different methods. Unfortunately, given the scope of such a study, and the size of the current investigation, this must be the focus of a future research project.

With an understanding of the different methods of closure employed in the sample and how the coda is connected to the recapitulation, Chapters Five, Six and Seven will explore the composition and function of the coda in the identified movements by Haydn, Mozart and Beethoven, respectively.

Chapter Five – The Coda in Haydn's First and Final Symphonic Movements

5.1 Introduction

Based on the data collected using the methodology outlined in Chapter Two, this chapter will explore the structure and function of the coda in Haydn's first and final symphonic movements. This chapter, as with Chapters Six (The Coda in Mozart's First and Final Symphonic Movements) and Seven (The Coda in Beethoven's First and Final Symphonic Movements), will determine the 'average' numerical prototype coda as identified by the mean (average) of the compositional parameters explored (structural proportions, harmony, thematic material, instrumentation and orchestration). Chapters Six and Seven will follow the same format as Chapter Five. The average data presented here is an amalgamation of all the data collected for Haydn's codas. The figures and tables included in Chapter Five do not represent all the data collected with regard to Haydn's codas. The data presented in this chapter represents the 'average' Haydn coda and, as a result, certain data sets may be omitted owing to them not featuring in the 'average' Haydn coda. For example, the average data presented for chord use does not suggest the presence of Neapolitan chords in Haydn's codas. However, an example can be found in the coda from H/73/1. It is not that the coda cannot contain Neapolitan chords; rather, it is that the Neapolitan chord is not a constant of Haydn's coda organisation.

This chapter will also identify and compare the most and least prototypical movement coda for each of the parameters in isolation and in combination. It will cross-compare the mean data for the coda in Haydn's first movements with the coda in the final movements to address the question raised in Section 4.2.5 (p. 174), which asks whether or not the coda is constructed in a similar format for both the first and final movements. Finally, the chapter will highlight any compositional parameters which undergo change over time (e.g., whether or not the use of CM increases or decreases over time in Haydn's coda). Section 5.2 outlines the prototypical data for the four investigated parameters of Haydn's codas.

5.2 Prototype Haydn Coda Data

5.2.1 Prototype Structural Proportions Data

On average, the starting bar of Haydn's codas are identifiable by three criteria, with generally four applicable criteria (i.e., four criteria can identify a candidate starting bar, but only three identify the same bar). Haydn's coda sections average 31 bars in length, constituting, on average, 13% of the whole movement. Given that to identify the source of the thematic material in the coda, it was necessary to analyse the exposition and development section, it is possible to provide an average proportional length for the introduction, exposition, development, recapitulation and coda. The exposition is the largest section, proportionally 39%, on average, of the whole movement. In 16 of the 63 movements containing a coda an introduction is added. When added, this section constitutes approximately 5% of the movement on average. The development and recapitulation sections are, on average, fairly similar in length, with the mean proportional lengths measuring 24% and 22%, respectively. Figures 5.1 and 5.2 show the structural proportions in the prototypical sonata-form first and final movement by Haydn. Figure 5.1 shows the average structural proportions for a movement containing an introduction, whilst Figure 5.2 shows the average structural proportions for a movement which does not contain an introduction.[22]

[22] The differences between the proportions of a first and final movement are explored in Section 5.3.1.

Figure 5.1 – Prototype structural proportions for the symphonic sonata-form first and final movements with introduction by Haydn.

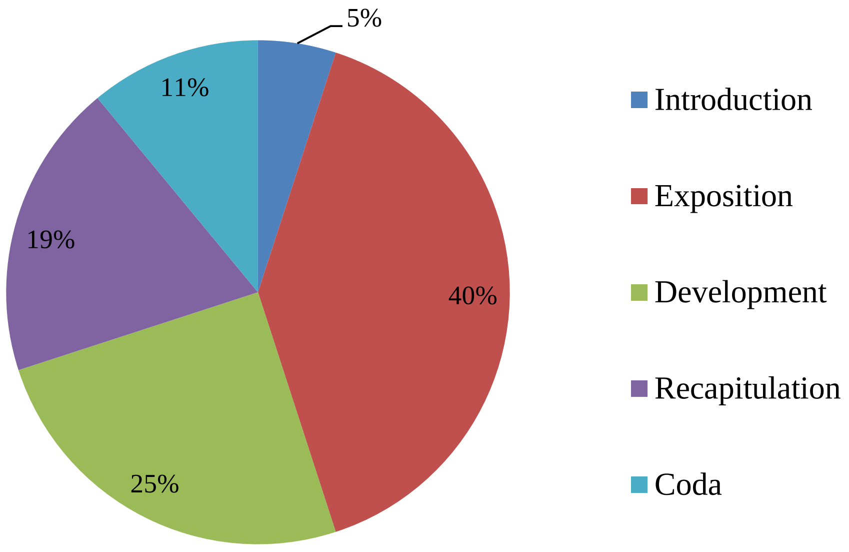
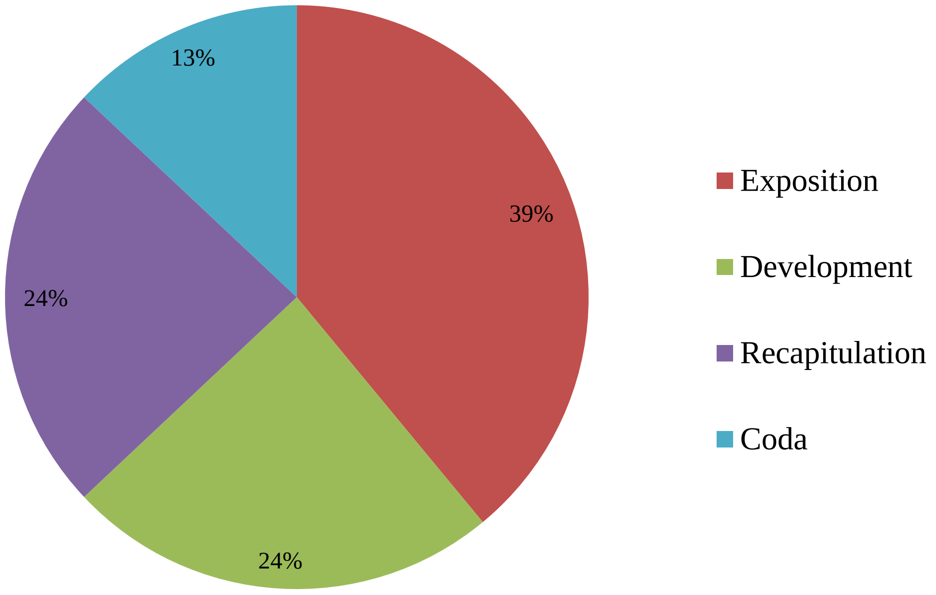


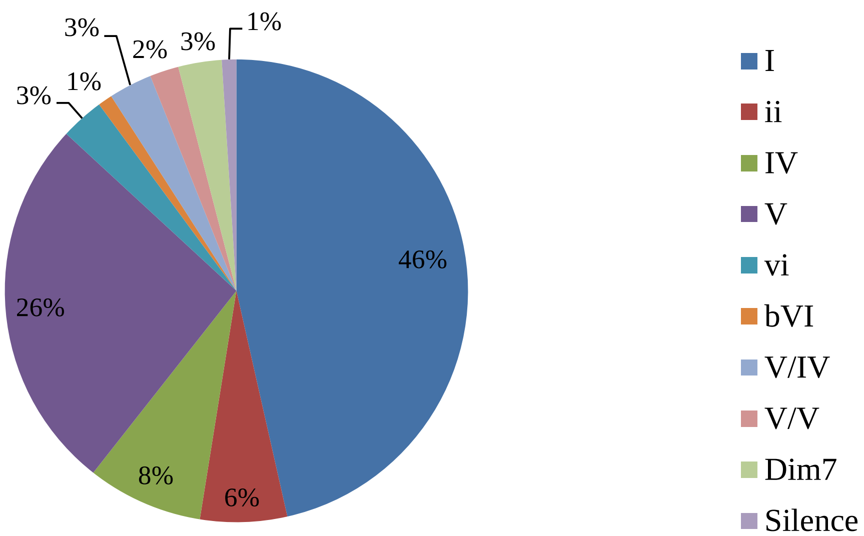
Figure 5.2 – Prototype structural proportions for the symphonic sonata-form first and final movements without introduction by Haydn.



5.2.2 Prototype Harmonic Data

Haydn's codas contain, on average, a proportion of tonic harmony equivalent to 46% of the section. This is by far the most common harmony found in the coda, with the dominant harmony being the second most common (26%), and the subdominant the third (8%). On average, the remaining 23% of the coda is constructed of supertonic, submediant, diminished-seventh and secondary-dominant harmonies. The average proportion of dominant and subdominant chords in Haydn's codas is the largest in comparison with Mozart and Beethoven. In addition to this, Haydn's codas also contain the fastest average harmonic rhythm of the three composers, measuring 1.46 chords per bar. Figure 5.3 shows the harmonic proportions in the prototype symphonic sonata-form first- and final-movement coda by Haydn.

Figure 5.3 – Prototype chord proportions for the symphonic sonata-form first- and final-movement coda by Haydn.[23]



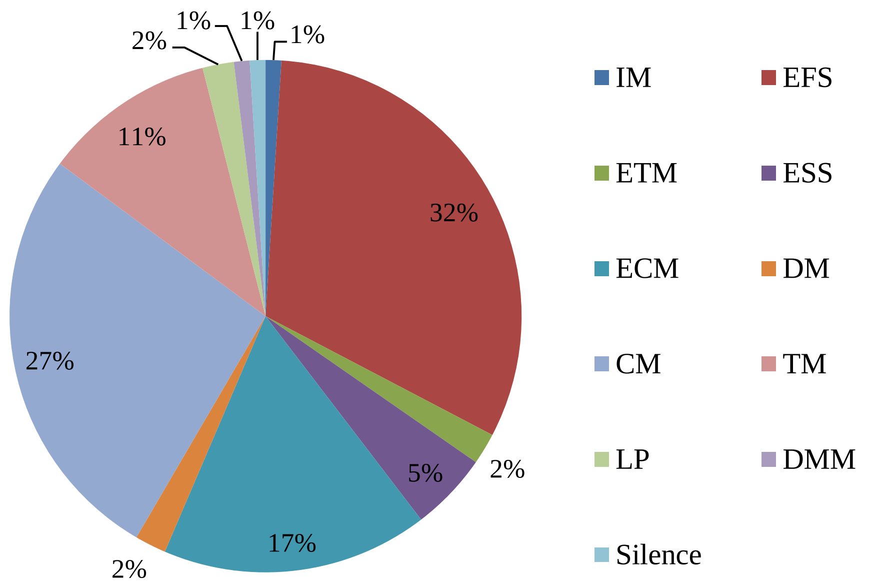
5.2.3 Prototype Thematic Data

The prototype suggests that Haydn's codas contain the largest proportion of CM across all three composer samples.[24] Coupled with the passages of TM these two sections

[23] The category labelled 'Dim7' encompasses chords on a number of scale degrees including ♮iii, ♯IV and VII. This approach is adopted for all three composers.

make up, on average, 38% of the coda. The remainder of the coda retraces or develops material from two primary sections. On average, 17% of the coda is constructed from material retraced from the EFS, with a further 15% of the coda comprising material which expands or develops the EFS. The ECM also features again in the coda, with this material, either in its original form or with slight variation, constituting 17% of the coda (10% and 7%, respectively). Figure 5.4 shows the thematic proportions in an average symphonic sonata-form first- and final-movement coda by Haydn. To simplify the presentation of data, coda material which is based on an expansion or variation of material from earlier in the movement is grouped together with coda material which repeats almost directly material from earlier in the movement (e.g., material from the EFS and material expanded from the EFS).

Figure 5.4 – Prototype thematic organisation of the symphonic sonata-form first or final movement coda by Haydn.



[24] As explained in Section 2.4.3 (p. 76), IM=Introduction material, EFS = Expositional First Subject, ETM = Expositional Transition Material, ESS = Expositional Second Subject, ECM = Expositional Closing Material, DM = Development Material, CM = Cadential Material, TM = Tonic Material, LP = Link Passage, DMM = Different Movement Material.

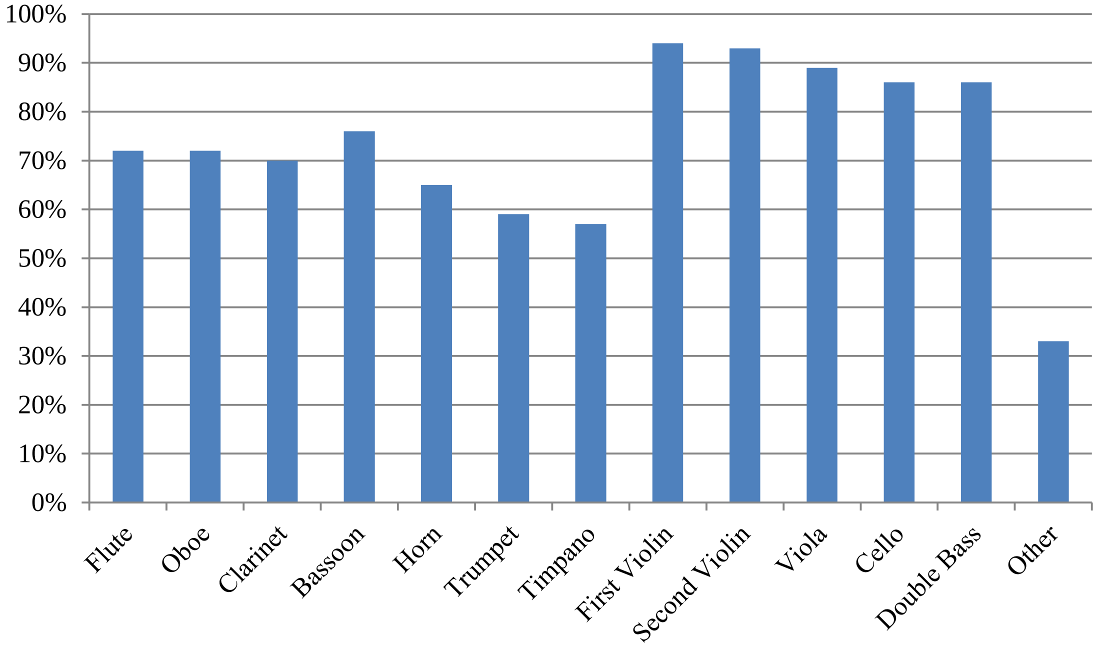
Although not occurring in all codas, where there is repetition of material within the coda (e.g., repetition of cadential gestures), this, on average, constitutes 6% of the section. Haydn's codas also provide an example where the coda contains thematic material from a different movement (DMM). The first 29 bars of the coda from H/46/4 contain material from the *Menuetto* of the third movement. Not only is the material from the third movement incorporated in the coda of the fourth, but the repeat of material – which in the third movement is indicated by the presence of repeat marks – is also included, written out in full. Haydn also includes material used in the movement's introduction in his codas. An example of this in Haydn's sample can be found in H/103/1 (bb. 201–212). However, as with the incorporation of DMM, this occurs infrequently (in only 3% of the sample).

5.2.4 Prototype Instrumentation and Orchestration Data

Finally, with regard to the use of instrumentation and orchestration in Haydn's codas, the prototype for the total percentage orchestration is the lowest, although not by a significant value, of all three composer samples. The total orchestration of Haydn's codas averages 77% (i.e., on average 77% of the instruments are sounding at any one time in the coda). The orchestration gradient measures 0.014, suggesting very little change in the number of instruments deployed in Haydn's codas. Interestingly, given the high percentage of tonic and dominant chords present in Haydn's codas, the use of use of horns is significantly lower in Haydn's codas than in Mozart's and Beethoven's (eight percentage-points).

As with Haydn's use of third-movement thematic material in the fourth movement coda, Haydn's codas also provide the only example of additional instrumentation in this section. The coda in H/98/4 contains a foreground cembalo, and the coda in H/100/4 contains the same additional 'Turkish' instruments (triangle, cymbals and bass drum) found in the second movement. With the exception of these two works, the instrumentation of the coda is naturally determined by the movement to which it is attached. The most common instrumentation (mode average) for Haydn's codas is two flutes, two oboes, two bassoons, two horns, two trumpets, two timpani, first and second violins, violas, cellos and double basses. However, there are a number of examples in Haydn's later works which incorporate two clarinets. Figure 5.5 shows the average instrumentation proportions in the sample.

Figure 5.5 – Prototype use of instrumentation in symphonic sonata-form first- and final-movement codas by Haydn.



5.3 Comparison of the First and Final Movement Prototype Codas

In Chapter Four the question 'Do composers construct the coda differently depending on the movement to which it is attached?' was asked. With the average data collected for all Haydn codas, the sample can be divided into first- and final-movement codas and the data compared to determine whether or not any significant differences are present. A difference between the first and final movement is regarded as significant if the prototype data for either movement diverges more than five percentage-points from the combined prototype data. If numerous significant differences are present between the two movement samples, then it will be necessary to explore and identify the prototypical coda with regard to the first and final movements separately.

5.3.1 Structural Proportions

Based on the data collected for the size of Haydn's codas, the structural proportions of movements which contain a coda, and the number of criteria used to identify the coda, a number of comparisons can be identified. Table 5.1 provides a comparison of the average proportional data for the coda in the first and final movements of Haydn's symphonies, to be read in conjunction with the combined movement prototype shown in Figures 5.1 and 5.2.

Table 5.1 – Comparison of the prototype structural data for the codas in Haydn's first and final movements.[25]

	Proportional Size of Movements (%)		
	First Movement Prototype with Introduction	First Movement Prototype without Introduction	Final Movement Prototype (%)
Introduction	5	n/a	0
Exposition	40	36	40
Development	25	28	22
Recapitulation	19	24	24
Coda	11	11	14

	Number of Criteria	
Criteria applicable to the identification of the coda	4	4
Criteria eligible for the identification of the coda	2	3

As be seen from Table 5.1, there are very few differences between Haydn's first movements which contain a coda and the final movements which contain a coda. With the exception of first movements which do not contain an introduction, the exposition broadly maintains its proportional size in both movements. The development section is, on average, proportionally larger in the first movements, whilst, with the exception of first movements which contain an introduction, the recapitulation broadly maintains its proportional size in

[25] Given that the percentages found in this chapter are presented to zero decimal places, the combined totals (e.g., the addition of all five structural sections) may not equal 100%.

both movements. On average, the coda is only three percentage-points longer in Haydn's final movements. The longest codas in Haydn's first movements, found in H/75 and H/77, are proportional to 19% of the movement (28 and 41 bars, respectively). However, the longest codas in Haydn's final movements, found in H/46 and H/90, are proportional to 29% of the movement (62 and 90 bars, respectively). From observation of the structural data, it would appear that in Haydn's final movements this proportionally larger coda section appears to be balanced by a proportionally smaller development section.

In addition to the size of the coda, the average number of criteria applicable for the identification of the start of the coda is fewer in the first movement than it is in the final movement. Although the number of criteria which can be applied to identify the start of the coda remains the same in both movements, on average only two criteria are eligible to identify the starting bar of the coda in Haydn's first movements, whereas three are eligible for coda identification in the final movements. Not only are Haydn's codas in the final movements proportionally larger, but they are also identifiable by a slightly larger range of different criteria. It is worth nothing that, although these changes have been highlighted, the differences between the movement-type averages and the prototype are not substantial, with the largest difference, between the proportions of the development section in the first and final movements only totalling four percentage-points. Although there are exceptions, on average the codas of the first and final movements are similar with regard to their structural proportions.

5.3.2 Harmonic Data

As with the structural proportions of the coda in the first and final movements of Haydn’s symphonies, the harmonic data collected shows no significant differences between the two movements. Table 5.2 provides a comparison of the average harmonic data for the coda in the first and final movements of Haydn’s symphonies, to be read in conjunction with the combined movement prototype shown in Figure 5.3.

Table 5.2 – Comparison of the prototype harmonic data for the codas in Haydn’s first and final movements.

		Combined Movement Prototype	First Movement Prototype	Final Movement Prototype
Proportion (%)	I	46	44	47
	ii	6	6	5
	IV	8	8	8
	V	26	27	25
	vi	3	3	3
	bVI	1	0.25	1
	V/IV	3	4	2
	V/V	2	2	2
	Dim7	3	3	3
	Silence	1	0.34	1

Chord Diversity	7	7	7
Harmonic Rhythm (per bar)	1.46	1.54	1.41

Chord Proportions

As the data show, there is very little difference between the percentage usage of chords and the chord diversity in Haydn’s first and final movements. The largest percentage-point difference (3%) can be found between the presence of tonic harmony in the first and final movements (44% and 47%, respectively). The largest proportion of tonic harmony in Haydn’s first movements can be found in H/67. The tonic harmony in this movement constitutes 69% of the coda. However, this figure is eleven percentage-points smaller than the proportion of tonic harmony used in H/23/4.

This slight reduction of tonic harmony in the first movement average is balanced by the increased dominant harmony in the first movement. In comparison with the final movements, Haydn's first movements – where the average proportion of TM is less than the average in the final movements – appear to contain a greater presence of dominant harmony. For example, in H/98/1, 36% of the coda consists of tonic harmony whilst 48% of the coda consists of dominant harmony. In H/82/4, by contrast, the balance is reversed, with the coda consisting of 51% tonic harmony and 23% dominant harmony. This relationship between tonic and dominant harmony is supported by a 99% significant moderate negative SRCT result (-0.420) (Section 2.6, p. 87), which suggests that the greater the proportion of tonic harmony in the coda, the smaller the proportion of dominant harmony, and vice versa. This slight imbalance of tonic and dominant harmony between the first and final movements could be explained by the larger proportions of certain thematic material present in the first-movement coda.

Harmonic Rhythm and Chord Diversity

Although there is no difference in the average chord diversity of the two movements, there is some variation in the rates of harmonic rhythm. Based on the two movement prototypes, it is concluded that the codas in Haydn's final movements have a slower harmonic rhythm than the first movements. This slower harmonic rhythm could be attributed to the increased percentage of tonic chord present in the final movements and the fact that, once established, the coda does not regularly deviate from this chord. An example of this can found in H/25/4. The coda here consists of 70% tonic harmony and 15% dominant harmony with a slow harmonic rhythm measuring 1.10.

5.3.3 Thematic Material Data

Unlike the prototypes calculated for the structural and the harmonic proportions for the coda in the first and final movements of Haydn's symphonies, the prototypes calculated for the use of thematic material do show some variation between the two movements. The significant differences can be found in the use of ECM and CM. Table 5.3 provides a comparison of the prototype thematic material data for the coda in the first and final movements of Haydn's symphonies, to be read in conjunction with the combined movement prototype shown in Figure 5.4.

Table 5.3 – Comparison of the prototype thematic material data for the codas in Haydn's first and final movements.

		Combined Movement Prototype	First Movement Prototype	Final Movement Prototype
Proportion (%)	IM (where applicable)	1	2	n/a
	EFS	32	31	32
	ETM	2	5	1
	ESS	5	7	4
	ECM	17	22	13
	DM	2	2	2
	CM	27	23	31
	TM	11	8	12
	LP	2	1	3
	DMM	1	n/a	1
	Silence	1	0.34	1
	Thematic Diversity	4	4	4

As can be seen from Table 5.3, on average there appears to be an equal amount of EFS material (31:32%) being used in the coda in both Haydn's first and final movements. However, with regard to material taken from other sections of the exposition, it appears that Haydn's first-movement codas are more complex than the final movements, taking larger quantities of material from various sections. There is a four percentage-point difference in the use of ETM and a three percentage-point difference in the use of material from the ESS in the first movements. However, it is the difference in the use of ECM which is most significant. In comparison with the final movement, on average, ten percentage-points more of the first-movement coda is made up of material taken from the ECM. This is contrasted with the proportion of CM and TM present in the two movements. CM and TM, on average, constitute 31% and 12% of the coda in Haydn's final movements, respectively, eight and four percentage-points more, respectively, than in the first-movement codas. This is perhaps to be expected, given the larger proportions of CO1 in Haydn's first movements (Section 4.2.5, p. 174). Given that movements which end with CO1 require a repeat of the ECM to close, and that the incorporation of codas into the first movement of Haydn's symphonies occurred later than the coda in the final movements (Section 4.2.5, p. 174), the first-movement coda could be viewed as a development of this method of closure. It is therefore not surprising to see that a number of first-movement codas are thematically dependent on ECM.

The increased proportion of TM in Haydn's final-movement codas also relates to the increased proportion of tonic-chord use discussed in Section 5.3.2 (p. 214). Ipso facto, there is a 99% significant moderate positive SRCT (0.44) between the use of TM and the use of the tonic chord. The reduction of TM, and subsequently of tonic chords, in Haydn's first-movement codas could be explained by the increased proportion of ECM present in these codas. In comparison with the TM (which, as the name suggests, is comprised exclusively of tonic chords), the ECM contains cadences and thematic ideas from the exposition, and thus a greater variety of chords.

5.3.4 Instrumentation and Orchestration Data

In general, the instrumentation and orchestration of Haydn's first- and final-movement codas appear to be fairly consistent, with only two identifiable differences. Table 5.4 provides a comparison of the average instrumentation and orchestration data for Haydn's codas, to be read in conjunction with the combined movement prototype shown in Figure 5.5.

Table 5.4 – Comparison of the prototype instrumentation and orchestration data for the codas in Haydn's first and final movements.

		Combined Movement Prototype	First Movement Prototype	Final Movement Prototype
Proportion (%)	Flute	72	71	73
	Oboe	72	71	74
	Clarinet	70	70	71
	Bassoon	76	78	75
	Horn	65	66	65
	Trumpet	59	53	61
	Timpano	57	56	58
	First Violin	94	96	93
	Second Violin	93	95	91
	Viola	89	92	86
	Cello	86	87	86
	Double Bass	86	86	86
	Other	33	n/a	33

Total Percentage Orchestration (%)	77	79	76
Orchestration Gradient	0.014	0.014	0.014

As can be seen from Table 5.4, there is a significant eight percentage-point difference between Haydn's first and final movements in the use of the trumpet and a 33 percentage-point difference in the use of 'other' instruments. As discussed earlier in Section 5.2 (p. 206), the codas in Haydn's final movements contain the only evidence of other instruments (i.e., ‘Turkish’ instruments), beyond the typical instrumentation of the late-eighteenth and early-nineteenth century symphony added to the coda. These extra additions are represented by the data recorded (33%) in the ‘other’ category.

Based on the prototypes, and with the exception of the bassoon, there appears to be, on average, a slightly larger proportion of woodwind instruments present in Haydn’s final-movement codas than the first-movement codas. However, in comparison, there appears to be a greater proportion of string instruments present throughout the first-movement codas. It is worth noting that, although these differences are highlighted in Table 5.4, no statistical correlation (SRCT) exists between the deployment of these two instrumental families. Therefore, there is no evidence to suggest that a preference or pattern exists for the orchestration of Haydn’s codas in the first and final movements.

As suggested, perhaps the most interesting of the differences between the first and final movements is in the use of trumpet. On average the trumpet is used proportionally more in the final-movement codas. One might think that as a fanfare instrument, this use reflects Haydn’s attempts to create a grander and more emphatic feeling of conclusion in the final movements. Unfortunately, there is little evidence to support this theory other than that the use of the trumpet is related to the increased use of TM. A SRCT between Haydn’s use of the trumpet, use of TM, and use of CM and TM combined reveals a 99% significant moderate positive correlation (0.46) between the use of trumpet and the use of TM. Although the tests for correlation do not suggest or detect causality, it could be speculated that the larger proportion of TM in the final-movement codas in comparison with the first-movement codas allows for an increased use of the trumpet, which is restricted, normally, to the tonic-key harmonic series.

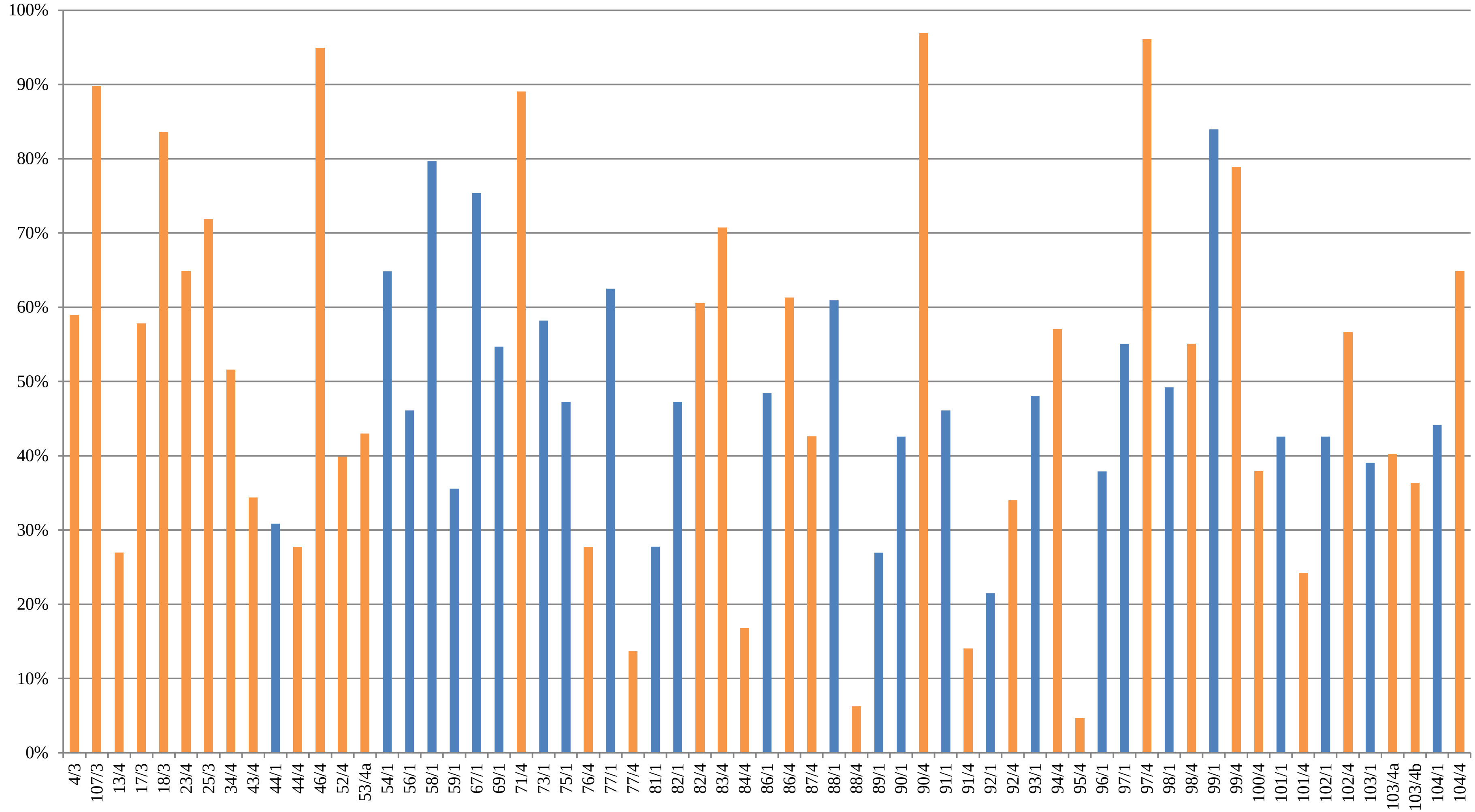
5.4 Parameter Prototypical Codas

With the prototype for each of the parameters established, Section 5.4 is concerned with the deviation of Haydn's codas from the identified prototypes: i.e., how far Haydn's codas are, numerically, from the prototype. Are the codas good examples of the prototype or are there numerical anomalies? Because Section 5.3 (p. 211) has revealed few significant differences between Haydn's codas in the first and final movements, codas from both movements will be compared against the combined average prototype. This process will identify codas which align with the prototype, including the most-conformant coda, whilst also identifying and exploring any codas which represent significant numerical anomalies. Although the first and final movements do not appear to have any significant differences *between* them with regard to their organisation, the data in this section will identify if there is a greater deviation in coda organisation from the prototype *within* either the first or final movements (i.e., although the parameter averages for the first- and final-movement codas are broadly the same, the range of the data may be different).

5.4.1 Spread of Codas with regard to the Structural Proportions Prototype

The figures presented in this section represent the ranking of the absolute and the proportional length of the coda with regard to the movement to which it is attached. Figure 5.6 shows the percentage-point deviation from the prototype for the structural proportions (Figures 5.1 and 5.2) of Haydn's codas. The blue bars represent the first-movement codas, whilst the orange bars represent the final-movement codas. The larger the percentage, the greater the distance from the prototype the coda is situated. The vertical baseline (0%) represents the prototype.

Figure 5.6 – Deviation of Haydn's codas from the structural proportions prototype.



The Codas Most Conformant to the Structural Prototype

Of the data in Figure 5.6, H/95/4 is calculated as the most conformant to the prototype in Section 5.2.1 (p. 206). At 31 bars long, not only is the raw length of the coda equal to the length of the prototype, but the coda is also proportional to 13% of the movement. The proportions for the rest of the movement do not match the prototype. The exposition and recapitulation section are thirteen and nine percentage-points, respectively, larger than the prototype and the development is thirteen percentage-points smaller. H/95/4 does not include an introduction.

Interestingly, the second most-conformant coda to the prototype, H/88/4, which is 32 bars long, and which is also proportional to 13% of the movement, contains a different structural weighting. The exposition of this movement is again larger than the prototype. However, in contrast, although the development is still smaller than the prototype (minus four percentage-points), it is the difference in the recapitulation which is the most significant. The recapitulation section is only proportional to 12% of the whole movement, smaller than the coda. It is possible that, owing to the large exposition section, a full restatement of the exposition material in the recapitulation was not required. It is also possible, given the sonata-rondo form of this movement, that the recapitulation is shorter because Haydn has omitted the full returns of the refrain. As Cole states, the penultimate refrain (ABAC$\underline{\text{A}}$BA) 'and subsequent returns of the [refrain] may be omitted. Mozart frequently omits this statement' (1969, p. 181). Given that Cole believes that 'Haydn became acquainted with the sonata-rondo in the works of Mozart' (cited in Fischer, 1992, p. 85), it is not surprising that Haydn adopts a similar organisation.[26] A coda larger than the recapitulation material in a sonata-rondo movement is also supported by Reicha (1824), whose model of this formal type suggests that the fourth section of sonata rondo is the longest and most important (in Cole, 1969, p. 185), What is interesting

[26] It is worth noting that Fischer disputes Cole's suggestion. He claims that 'Haydn actually began experimenting with the combination of sonata and rondo elements in a finale no later than 1773' (Fischer, 1992, p. 85).

about this coda and that in H/95/4, regardless of the structural changes and given that they are examples of a sonata-allegro and a sonata-rondo movement, respectively, is that they are both organised in the same way. Both codas consist of a final statement of EFS followed by CM and TM.[27] Further evidence of this thematic organisation can be found in H/77/4, the third closest coda to the structural prototype. Again, the coda consists of a final restatement of EFS followed by CM and TM.

The codas identified as most conformant to the prototype in Figure 5.6 suggest that those from final movements, rather than from first movements, are more structurally conformant. However, the spread of the data shows that greater proportions of first-movement codas (67%), rather than final-movement codas (47%), are closer than 50 percentage-points (mean value) to the prototype, and that there is a larger range (92%) between Haydn's most- and least-conformant final-movement codas. In addition to this, not only do the fourth movements contain the example of the *most*-conformant coda to the prototype (H/95/4), but they also contain the coda *least* conformant with the prototype.

The Codas Least Conformant to the Structural Prototype

Figure 5.6 identifies H/90/4 as the least-conformant coda with regard to the structural proportions. In comparison with the examples which are similar to the prototype, codas which are significantly larger appear often to comprise of a large proportion of exposition (both restated and expanded) and development material. In the coda from H/90/4, the proportion of TM is smaller than the prototype. As with the most prototypical codas, the recapitulation is still significantly smaller than the prototype. However, in contrast, the exposition section of H/90/4 is proportionally smaller and the development larger. This example would suggest a positive relationship between the relative size of the development section and the coda (i.e., the larger the development, the larger the coda). However, analysis of the next two non-

[27] The proportions of thematic material and the conformity of Haydn's codas to the thematic prototype will be discussed in Section 5.4.3.

conformant examples and correlation testing of the structural proportions show that this is not a trend found throughout the sample.

H/97/4 (the second least conformant example), which contains the coda with the largest raw length, and H/46/4, both contain proportional large codas. However, unlike H/90/4, the development sections of these movements are smaller than the prototype (19 percentage-points and 11 percentage-points, respectively). In H/46/4, the coda data is a product of the additional material incorporated from the third movement. If this additional passage is omitted from the coda, it becomes more comparable to H/88/4 and H/95/4. The remaining material is 33 bars long, proportional to 18% of the movement and consisting of EFS and CM.

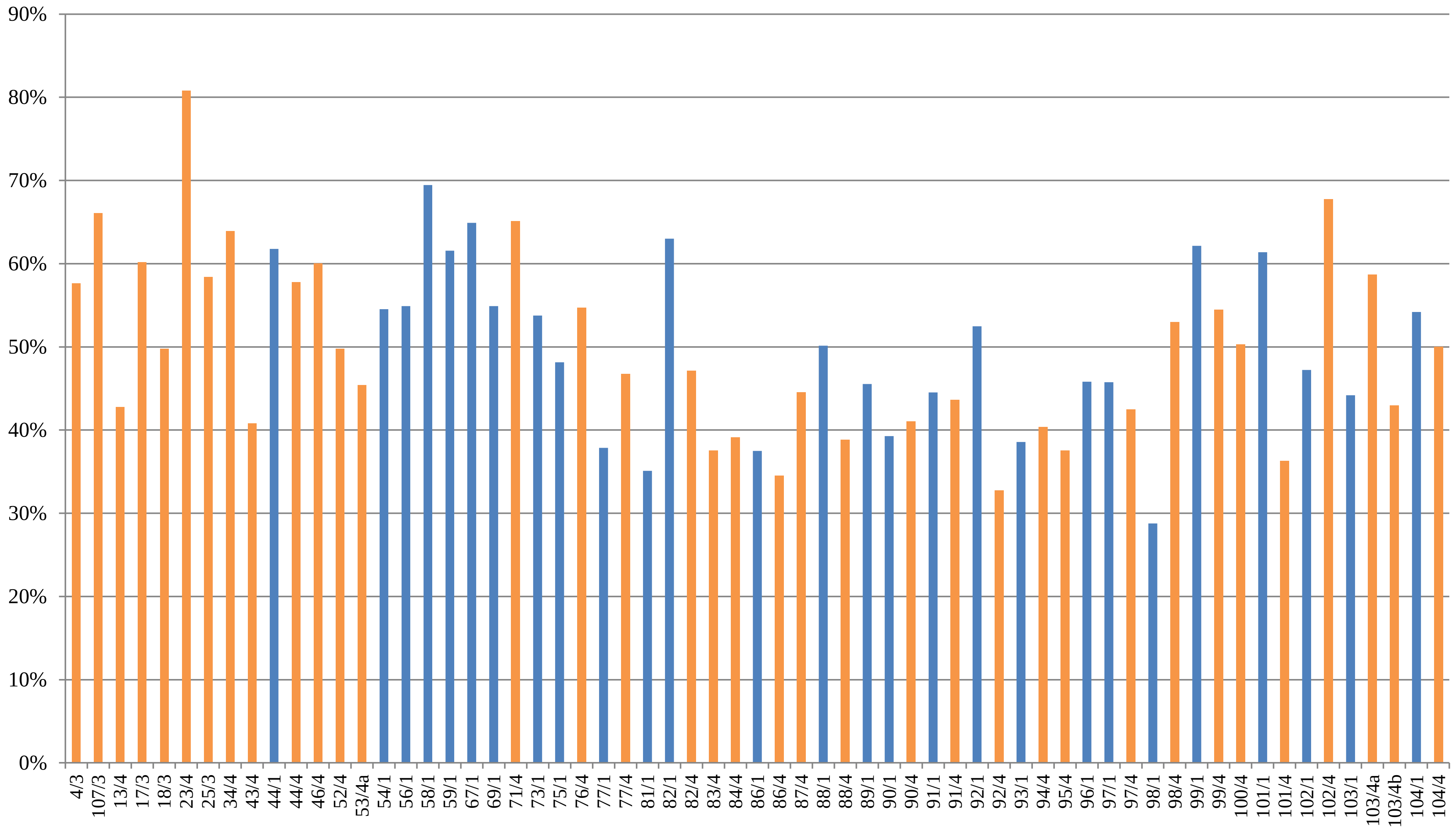
Applying the SRCT further reinforces the lack of any relationship between the size of the development and the coda. When the proportional size of every coda is compared with its exposition, development and recapitulation counterparts, only one 99% significant correlation was identified. Present in all the examples mentioned, the SRCT identified a moderate negative relationship (-0.43) between the size of the coda and the size of the recapitulation in Haydn's symphonies (i.e., the larger the coda section, the smaller the recapitulation). Thus it can be concluded that although no relationship exists between the size of the exposition, development and coda in Haydn's symphonies, it would appear that Haydn reduced the size of the recapitulation section when including a coda. This is perhaps a logical action, given that Haydn's larger codas appear to consist primarily of restated EFS, ECM, CM and TM. Haydn's codas appear to adopt the role of the recapitulation, restating the key EFS material and then creating closure through the use of emphatic chords and cadences.

Another statistically extreme example provides a different view of the structural proportions of the coda. H/107/3, the 60th coda from the prototype, is identified not as an extreme because it is significantly *larger* than the average, but rather because it is significantly *smaller*. In this example, the coda is only seven bars in length and proportional to 5% of the movement. Further examples of codas which are significantly smaller than the prototype can be found in H/71/4 (8 bars, 5% proportionally) and H/99/1 (12 bars, 4% proportionally). Interestingly, these codas appear to be constructed in the same manner as the prototype, but on a smaller scale. With the exception of the coda from H/71/4, which does not contain any restated exposition material, these codas contain a small passage of exposition material (often EFS or ECM) followed by CM and TM.

5.4.2 Spread of Codas with regard to the Harmonic Prototype

The figures presented in this section represent the ranking of each chord used, the chord diversity, the harmonic rhythm, and the harmonic gradient. Figure 5.7 shows the percentage-point deviation from the prototype (Figure 5.3) for the harmonic data of Haydn’s codas.

Figure 5.7 – Deviation of Haydn's codas from the harmonic prototype.



With regard to the harmonic organisation of Haydn's codas, H/98/1 is the most conformant to the prototype, whilst H/23/4 is the least conformant.

In comparison with the structural proportions of Haydn's coda, and even though the least conformant harmonic coda is taken from a final movement, there is a greater percentage of final-movement codas conforming to the prototype than first-movement codas. Forty-eight percent of the first-movement codas are located more than 50 percentage-points (mean value) from the prototype, ten percentage-points more than the final-movement codas. Although Haydn's final movements contain the least-conformant coda with regard to the harmonic parameter, they are in general more conformant with the harmonic prototype. Table 5.5 identifies the most- and least-conformant codas for each of the aspects investigated with regard to the harmonic parameter.

Table 5.5 – Most- and least-conformant Haydn codas for individual harmonic parameters.

Proportion of Chord:	Most-Conformant Coda(s)	Least-Conformant Coda(s)
I	H/92/4	H/23/4
ii	H/54/1, 97/1	H/92/1
IV	H/83/4	H/99/1
V	H/18/3	H/23/4
vi	H/86/4	H/75/1
bVI	n/a	H/90/4
V/IV	H/92/1	H/58/1
V/V	H/43/4	H/101/1
Dim7	n/a	H/97/1
Silence	n/a	H/23/4

Chord Diversity	H/13/4, H/52/4, H/53/4a, H/77/4, H/87/4, H/93/1, H/96/1, H/98/1	H/90/4
Harmonic Rhythm	H/93/1	H/83/4
Harmonic Gradient	H/88/4	H/58/1

The Coda Most Conformant with regard to the Chord Diversity

Although the most-conformant coda with regard to the harmonic data collected, H/98/1 is only the most prototypical example with regard to chord diversity. The prototype shows that Haydn's codas are constructed, on average, of seven chord types, as in H/98/1. This coda includes tonic, dominant, subdominant, submediant, supertonic and two secondary-dominant chords.

The Coda Most Conformant with regard to the Chord Proportions

With regard to the individual proportions of chords, H/98/1, although ranking close to the prototype, contains ten percentage-points fewer tonic, three percentage-points fewer supertonic and one percentage-point fewer subdominant chords than the prototype. However, the most significant difference in chord proportions can be found in the use of the dominant. There are 22 percentage-points more dominant chords in H/98/1 than there are in the prototype.

The Codas Most Conformant with regard to Harmonic Rhythm

The coda from H/98/1 provides a good example of the prototypical harmonic rhythm in Haydn's codas. Fourth closest to the prototype, the coda of this movement averages 1.52 chord changes every bar. Constructed of EFS, CM and TM, the harmonic rhythm in this coda increases to two or more chords per bar during the CM. This would suggest that the harmonic rhythm generally increases towards the end of the coda, building towards the final cadence or TM. However, although examples of this are present in the sample, the passage of increased harmonic rhythm can also be located at the start of the coda. H/93/1 is the closest example to the prototype harmonic rhythm (1.46). Unlike the coda from H/98/1, not only is the harmonic rhythm slightly slower in H/93/1, but the passage of increased harmonic rhythm is located at the *start* of the coda in the passages of restated ECM, and the harmonic rhythm in the CM is slower.

The harmonic rhythm in Haydn's codas is calculated, on average, at 1.46 chords per bar. Although there are a few examples of codas which are harmonically unchanging throughout – for example H/86/1 (harmonic rhythm: 2.05) and H/23/4 (1.00) – the majority (80% of Haydn's sample) appear to abide by the following two rules:

1. If the included material from the movement, whether that be from the exposition or development, is harmonically *active* (i.e., has a fast harmonic rhythm), then the harmonic rhythm will usually be slower towards the end of the coda or at cadential points, as seen in H/93/1.
2. If the harmonic rhythm of the exposition or development material included in the coda is slow (i.e., changing at one chord per bar), then the CM of the coda will usually contain a faster harmonic rhythm, as found in H/98/1.

The Coda Most Conformant with regard to the Harmonic Gradient

The harmonic gradient of the coda in H/98/1 is 16th from the prototype average. A gradient can be located between the range of +1 and -1 (Section 2.4.2, p. 76). Given that the gradients of Haydn's codas only have a small range of 0.1745 (-0.0316 to -0.2061), it could be suggested that they follow a similar trend regarding the order of chords used. This is somewhat to be expected, as discussed in Section 4.2.4 (p. 173), because a key principle of the coda involves the section ending on the tonic. Any harmonic progression in the coda will inevitably conclude with the tonic. The variation in range (0.1745) is created through the diversity of harmonic progressions in the codas leading to the tonic, and the speed at which the coda progresses to the tonic.

The Codas Least Conformant with regard to the Harmonic Prototype

Calculated as containing the least-conformant coda, H/23/4 provides contrasting data for the harmonic organisation of the coda. Given that this coda is constructed entirely of tonic chords, the proportions of chords are significantly different from the prototype, with 35 percentage-points more tonic and 26 percentage-points less dominant harmony. In addition to these points, this coda contains no chord diversity, ranking 59th in the sample from the prototype, no harmonic changes (56th), and a flat (0.00) harmonic gradient (48th).

Two further non-conformant examples of the coda can be found in H/58/1 and H/102/4. The former, in contrast with H/23/4, contains 25 percentage-points fewer tonic chords, whilst also containing 16 percentage-points fewer dominant chords. Based on the material of the ESS, the chord proportions of bb. 136–141 represent the most significant difference, in comparison with the prototype, in this coda, with an increased 47% presence (in relation to the prototype) of subdominant-related harmony. Furthermore, given the large proportion of subdominant-related harmony and the reduced proportion of CM and TM, the harmonic gradient in this coda is the least conformant with the prototype.

Harmonic Proportions and Raw Coda Length

By organising the codas into the upper, middle and lower tertiles with regard to their length, it is possible to identify the different harmonic proportions dependent on the length of the coda. Table 5.6 shows the average harmonic data for the three tertiles of codas, organised with regard to the raw length of the coda.

Table 5.6 – Tertile ranges showing the difference in coda harmonic organisation according to coda length.

		Mean							
	Raw Coda Length (bars)	Proportion (%)					Chord Diversity	Harmonic Rhythm	Harmonic Gradient
		I	ii	IV	V	vi			
Lower Tertile	1–20	55	5	9	20	2	5	1.55	-0.03479
Middle Tertile	20–40	44	7	8	29	3	7	1.48	-0.02979
Upper Tertile	41–88	38	4	7	27	3	10	1.36	-0.02894

Table 5.6 shows that as the length of Haydn's codas increase, the percentage of tonic harmony decreases whilst the proportion of dominant harmony increases, reaching a peak in the middle tertile. Furthermore, a wider range of chords are present in Haydn's larger codas. However, the harmonic rhythm becomes slower. The harmonic gradient becomes weaker, suggesting that, although still necessary, the primary focus of Haydn's larger codas is no longer just to reinforce the tonic. This hypothesis is supported by the wider overall chord diversity and the overall reduction in the proportion of tonic harmony. The increased chord diversity may be explained by the increased and more diverse thematic material used in such larger codas.

5.4.3 Spread of Codas with regard to the Thematic Prototype

The percentages presented in this section represent the ranking of the different thematic material used (e.g., EFS, DM, and TM) and the thematic diversity (the number of thematic sources) in Haydn's codas. Figure 5.8 shows the percentage-point deviation from the prototype (Figure 5.4) for the thematic data of Haydn's codas. Across the parameters measured, H/83/4 is the most conformant to the prototype (39 percentage-point from the prototype), whilst H/86/1 is the least conformant (58 percentage-point from the prototype). With regard to the spread of the codas from the prototype, there appears to be a greater percentage of first-movement codas than final-movement codas conformant with the prototype. Fifty-nine percent of the first-movement codas are within 50 percentage-points (mean value) of the prototype, nine percentage-points more than the final-movement codas.

Figure 5.8 – Deviation of Haydn's codas from the thematic prototype.

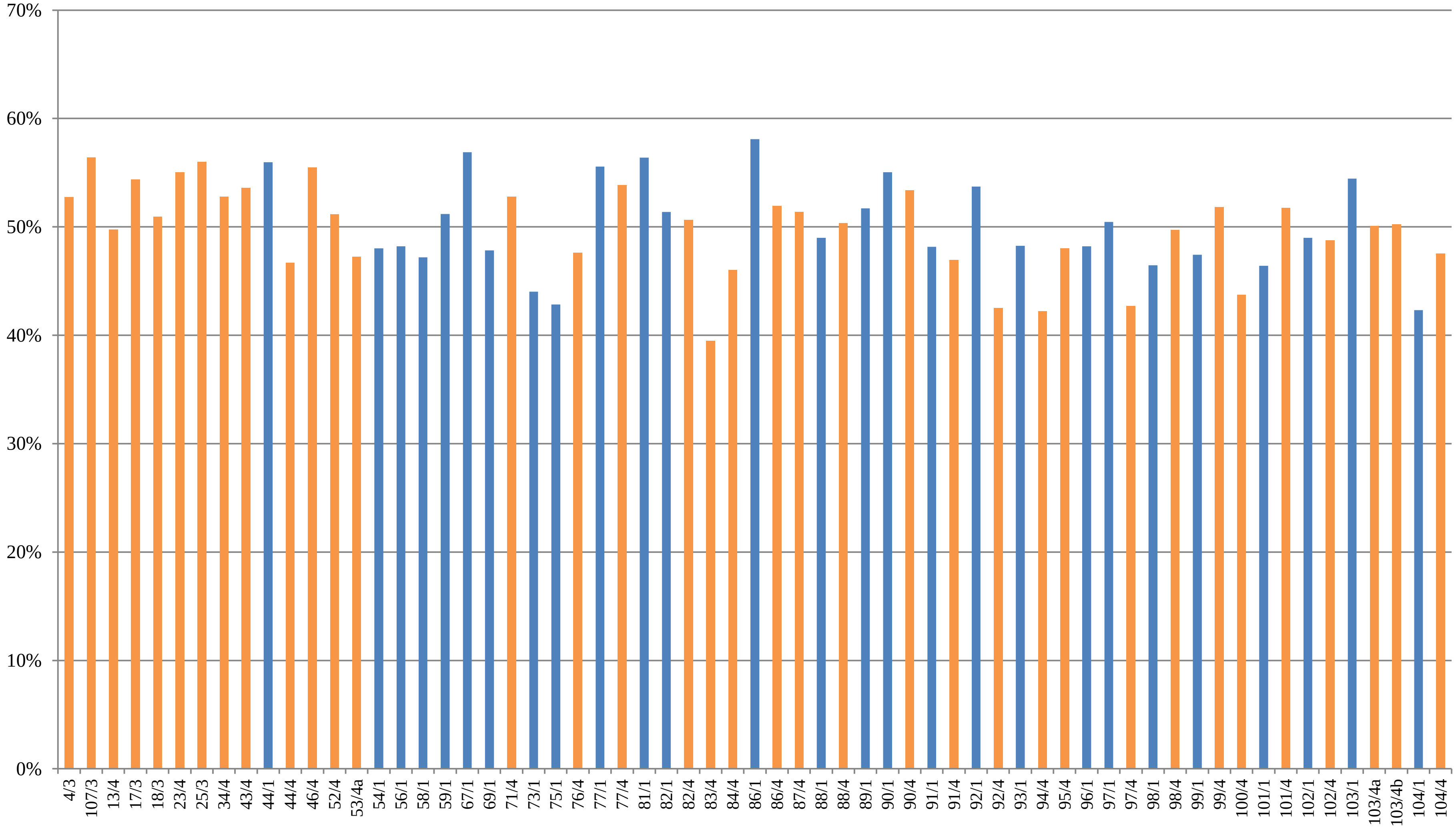


Table 5.7 shows the most- and least-conformant codas for each of the aspects investigated in representation of the thematic parameters.

Table 5.7 – Most- and least-conformant Haydn codas for individual thematic parameters.

Use of:	Most-Conformant Coda(s)	Least-Conformant Coda(s)
IM	n/a	H/103/1
EFS	H/46/4	H/67/1
ETM	n/a	H/69/1
ESS	H/90/4	H/58/1
ECM	H/89/1	H/73/1
DM	n/a	H/101/1
CM	H/54/1	H/18/3
TM	H/100/4	H/71/4
DMM	n/a	H/46/4
Thematic Diversity[28]	H/23/4, H/44/1, H/52/4, H/56/1, H/69/1, H/73/1, H/76/4, H/81/1, H/82/1, H/82/4, H/87/4, H/92/4, H/93/1, H/94/4, H/95/4, H/100/4, H/101/1, H/102/4, H/103/4a	H/103/1

The Coda Most Conformant with regard to the Proportions of Thematic Material

Although not containing ETM, ESS or DM, the coda from H/83/4 provides very conformant data for the use of EFS, ECM and CM. The proportion of EFS is only -1.5 percentage-points from the prototype, whilst the proportion of ECM is 3.2 percentage-points larger, and the proportion of CM 2.5 percentage-points smaller than the prototype. These figures are relatively small, with the largest differences for these parameters measuring 68.5 percentage-points, 54.6 percentage-points, and 62.5 percentage-points, respectively. This coda also provides an example of the use of TM. However, the data is non-conformant with the prototype, with the proportion of material being 15 percentage-points larger than the average.

[28] The codas most conformant with the thematic diversity prototype contain both sonata-allegro and sonata-rondo movements. H/100/4 is the most-conformant example for the proportion of TM used in the coda.

Although, H/83/4 contains the most-conformant coda to the prototype for the combined thematic sub-parameters, it is not the most-conformant coda for any of the sub-parameters in isolation. With regard to use of EFS, H/46/4, H/82/1, and H/86/4 are more conformant with the prototype. Observation of the positioning of EFS in these four movements highlights some structural similarities with regard to the use of thematic material in Haydn's codas.

Use of Thematic Material in the Coda

Situated on the tonic, the material from the EFS in H/82/1 is positioned towards the end of the coda (bb. 248–254) following an expansion of the ECM (bb. 239–245) and a short passage of CM (bb. 246–248). This EFS material then leads into the final bars of TM (bb. 255–261). Similarly, the coda in H/83/4 begins with an expansion/variation of the ECM (bb. 239–245) and CM. Following this passage, fragments of EFS material are presented (bb. 85–92) before one final cadence and a passage of TM (bb. 95–99). Not only are both of these codas constructed using thematic material taken from similar points in the respective expositions, but it would appear that both function, thematically, to re-familiarise the listener with the main subject material before bringing the movement to a close.

The same thematic template (ECM followed by EFS, CM and TM) can be found in the codas from H/46/4 and H/86/4, with minor differences. The coda in H/46/4, identified as the most-conformant coda with regard to the proportions of EFS, is also the least conformant with regard to the use of DMM. Although the coda (bb. 153–181) restates material from the third movement (bb. 15–26), once this has occurred the coda continues by stating variations of the final-movement EFS material (bb. 188–209) before closing with CM (bb. 210–212).

The coda from H/86/4, the largest of the five codas, contains two separate statements of the EFS material. The first statement of this material occurs at the beginning of the coda (bb. 138–145) and is followed by a short passage of CM (bb. 146–149). However, following the CM, the coda adopts a similar thematic structure to the coda of H/83/1. The second statement of the EFS material appears towards the end of the coda (bb. 163–167), after a statement of ECM (bb. 149–162) and before the CM (bb. 168–171) and TM (bb. 172–180).

At their core, Haydn's codas all appear to contain some variation on the thematic template found in H/83/4 (ECM–EFS–CM–TM). These variations may involve:

- the reordering of the four types of thematic material, as found in:
  - H/43/4 (EFS–CM–ECM–TM),
- the removal of one or two types of thematic material owing to the size of the coda, as found in:
  - H/107/3 (EFS–CM),
  - H/23/4 (ECM–TM),
- the addition of further thematic material, as found in:
  - H/46/4 (DMM–EFS–CM),
  - H/86/4 (EFS–CM–ECM–EFS–CM–TM),
  - H/104/4 (ECM–EFS–DM–EFS–CM–EFS–ECM–TM–CM).

The Coda Least Conformant with regard to the Proportions of Thematic Material

Identified as the least conformant, the coda from H/86/1 contains no reference to the EFS or ECM in the coda. Instead of a large proportion of EFS, this coda contains one of the largest proportions of ESS found in the Haydn sample. This movement is ranked 59th from the prototype. Finally, H/86/1 also contains a significantly larger proportion of CM than the prototype (21 percentage-points) and a smaller proportion of TM (eight percentage-points). This larger proportion of CM is perhaps to be expected given the lack of ECM found in this coda. Although non-conformant and containing material from the ESS rather than the EFS, the coda from H/86/1 still resembles the thematic progression of that in H/83/4. The ECM is replaced by ETM and the EFS by ESS. However, the progression (ETM–CM–ESS–CM–ESS–CM–TM) is still similar to that of H/83/4 (ECM–EFS–CM–TM).

Thematic Proportions and Raw Coda Length

As with the codas in the H/107/3 and H/86/4, the size of the coda affects the thematic material used. At only eight bars long, there is not space to incorporate large quantities of thematic material in the coda of H/107/3. Conversely, in a larger coda such as H/86/4, there is much more opportunity to incorporate larger amounts of thematic material from different sources. A comparison of the correlations between the raw length of the coda and the percentage of thematic material used shows a number of positive and negative trends. These correlations are summarised in Table 5.8, which shows the average thematic data for the three tertiles of codas organised with regard to the raw length of the coda.

Table 5.8 – Tertile ranges showing the difference in coda thematic organisation according to coda length.

	Raw Coda Length (bars)	Mean					
		Proportion (%)					Thematic Diversity
		EFS	ECM	CM	TM	Other[29]	
Lower Tertile	1–20	30	13	32	16	7	3
Middle Tertile	21–40	31	18	29	8	14	4
Upper Tertile	41–88	34	18	21	9	17	5

[29] Given their generally reduced use, IM, ETM, ESS and DM are combined in this column.

As Table 5.8 shows, the upper tertile of codas (those over 40 bars in length) is constructed with a higher proportion of EFS, ECM and the thematic material grouped under 'other'. In comparison, the lower tertile (those under 20 bars in length) contains the largest proportion of CM and TM. The data suggests that, as the codas increase in size, the proportions of EFS, ECM, IM, ETM, ESS and DM also increase. However, the proportions of CM and TM decrease. Given the larger proportion of 'other' thematic material (e.g., IM and ESS) in the upper tertile of codas, it is of no surprise that the thematic diversity (i.e., the number of different thematic sources) also increases as the codas increase in size.

5.4.4 Spread of Codas with regard to the Instrumentation and Orchestration Prototype

The values presented in this section represent the ranking of each instrument used, the overall percentage orchestration (the average number of instruments used per bar), and the orchestration gradient in Haydn's codas. Figure 5.9 shows the deviation from the prototype (Figure 5.5) for the instrumentation and orchestration data of Haydn's codas. H/83/4 is again the most conformant to the prototype, whilst H/54/1 is the least conformant.[30] With regard to the spread of the codas from the prototype, there appears to be a greater percentage of first-movement codas conformant with the prototype. Fifty-two percent of the first-movement codas are within 50 percentage-points (mean value) of the prototype, whereas only 47% of the final movements are within this range. Table 5.9 shows the most- and least-conformant codas for each of the instrumentation and orchestration parameters.

[30] Although both H/83/4 and H/103/4b produce the same percentage data (to zero decimal places), H/83/1 is numerically (to one decimal place), the most-conformant coda to the prototype. Likewise, H/54/1, in comparison with H/99/4, which again produce the same percentage data (to zero decimal places), is numerically (to one decimal place), the least-conformant coda to the prototype.

Figure 5.9 – Deviation of the instrumentation and orchestration data for Haydn's codas from the prototype.

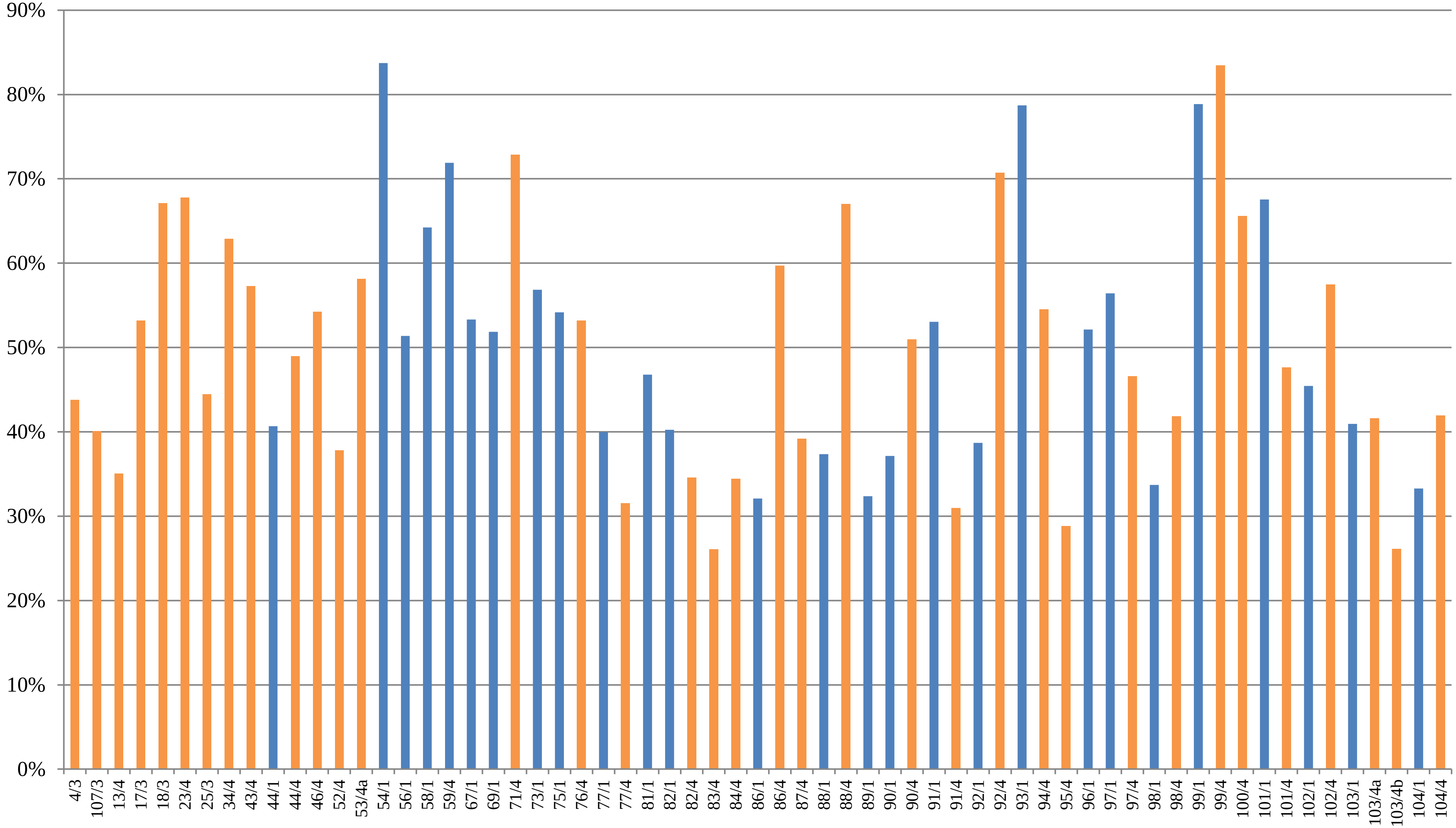


Table 5.9 – Most- and least-conformant Haydn codas for individual instrumentation and orchestration parameters.

Use of:	Most-Conformant Coda(s)	Least-Conformant Coda(s)
Flute	H/13/4	H/54/1
Oboe	H/97/4	H/23/4
Clarinet	H/130/4b	H/103/4a
Bassoon	H/76/4	H/59/4
Horn	H/77/4, H/89/1	H/18/3, H/58/1 H/71/4, H/99/4
Trumpet	H/92/1	H/99/4
Timpano	H/92/1	H/99/4
First Violin	H/103/4a	H/103/1
Second Violin	H/103/4a	H/59/4
Viola	H/54/1	H/59/4
Cello	H/107/3	H/59/4
Double Bass	H/107/3	H/59/4
Cembalo	H/98/4	
Triangle/Cymbal/Bass Drum	H/100/4	
Total Percentage Orchestration	H/91/4	H/59/4
Orchestration Gradient	H/103/4a	H/25/3

Observation of the most-conformant coda suggests that Haydn's codas are heavily orchestrated, with an average of seven out of nine instruments in H/83/4 sounding in each bar (78%). Furthermore, with only one exception (H/23/4), every coda in the sample concludes with an orchestral tutti (100%). Interestingly, study of the raw data collected not only suggests a standard orchestration format for the close of the coda, but also a relationship between the thematic material employed and the percentage of orchestration throughout the coda.

Based on the prototype, it would appear that the level of orchestration reflects the thematic material used in the coda. CM and TM are almost always orchestrated *tutti*, whilst the material from the exposition or development either reflects the original orchestration used or contains lighter and more diverse levels of orchestration. H/83/4, given its conformity to the prototype for both the use of thematic material and the orchestration of the coda, provides a textbook case study of this relationship.

Concluding with the material of the exposition (bb. 20–28), the recapitulation from H/83/4 finishes with an orchestral *tutti* (bb. 75–79). At this point (b. 80), the recapitulation and coda become elided, with the coda commencing with the final bars of the recapitulation (bb. 80–83) and the ECM (bb. 28–30). Following an imperfect cadence and break in the rhythmic continuity (b. 84), the coda restates material from the EFS. It is at this stage that the percentage orchestration falls, dropping from orchestral *tutti* to string ensemble (reflecting the orchestration of this part of the exposition). During these seven bars of fragmented and varied EFS material (bb. 85–91), the level of orchestration begins to increase, with the addition of two oboes, flute and two bassoons. Finally, the material taken from the EFS leads into CM and the horns enter (bb. 92–94). The coda concludes with orchestral *tutti* CM followed by TM (95–99).

Even in the less conformant examples, the coda still aligns with this generalised hypothesis. H/59/4 is identified as the least-conformant coda from the prototype for the proportional use of the second violin, viola, cello and double bass, and the total percentage orchestration. Although the figures extrapolated for this coda are the least conformant, the coda continues to follow the generalised hypothesis stated above. The imbalance of instrumentation is caused only by Haydn’s focus on the horn call and oboe response which begins the movement (bb. 1–12). The orchestration of the coda is a reflection of the exposition orchestration: the coda restates and then expands the thematic material and orchestration from the EFS (bb. 131–149) before ending with an orchestral tutti cadence (bb. 150–151).

Interestingly, the generalisation relating to the increase in the total percentage of orchestration (the average number of instruments used per bar) as the coda progresses is not supported by the orchestration gradient data presented in Section 5.2.4 (p. 210) which suggests no change in the orchestration percentage as the coda continues. This is most likely owing to the presence of isolated orchestral *tutti* passages located towards the beginning of coda sections, such as the opening passage (bb. 81–83) from the coda of H/83/4, and the number of examples which exist – such as H/71/4 and H/99/4 – where the total percentage of orchestration remains the same throughout the coda (100%). These examples skew the processed gradient data, resulting in the much weaker positive correlation average identified.

Instrumentation/Orchestration and Raw Coda Length

As with the harmonic and thematic data, relationships exist between the instrumentation and orchestration of the coda and the raw length. Table 5.10 shows the average instrumentation and orchestration data for the three tertiles of codas organised with regard to the raw length of the coda. With the exception of the flute, the proportion of instruments used reduces the larger the coda section. Given that the total percentage orchestration also decreases, this data could reflect a transition from a statistically unchanging orchestral *tutti* in smaller codas to smaller, more diverse orchestrations in larger examples. This reduction of instrumentation between tertiles is also reflected in the total orchestration percentage.

Table 5.10 – Tertile ranges showing the difference in coda instrumentation and orchestration according to coda length.

	Raw Average Length (bars)	Lower Tertile	Middle Tertile	Upper Tertile
		1–20	21–40	41–88
	Total Percentage Orchestration (%)	86	78	69
	Orchestration Gradient	0.02	0.02	0.01
Proportion (%)	Flute	84	69	72
	Oboe	77	70	68
	Clarinet	92	64	64
	Bassoon	85	75	71
	Horn	72	65	57
	Trumpet	71	60	54
	Timpano	71	56	54
	First Violin	97	94	92
	Second Violin	97	93	88
	Viola	92	88	86
	Cello	89	87	84
	Double Bass	89	87	83

5.5 The Meta-Prototypical Haydn Coda

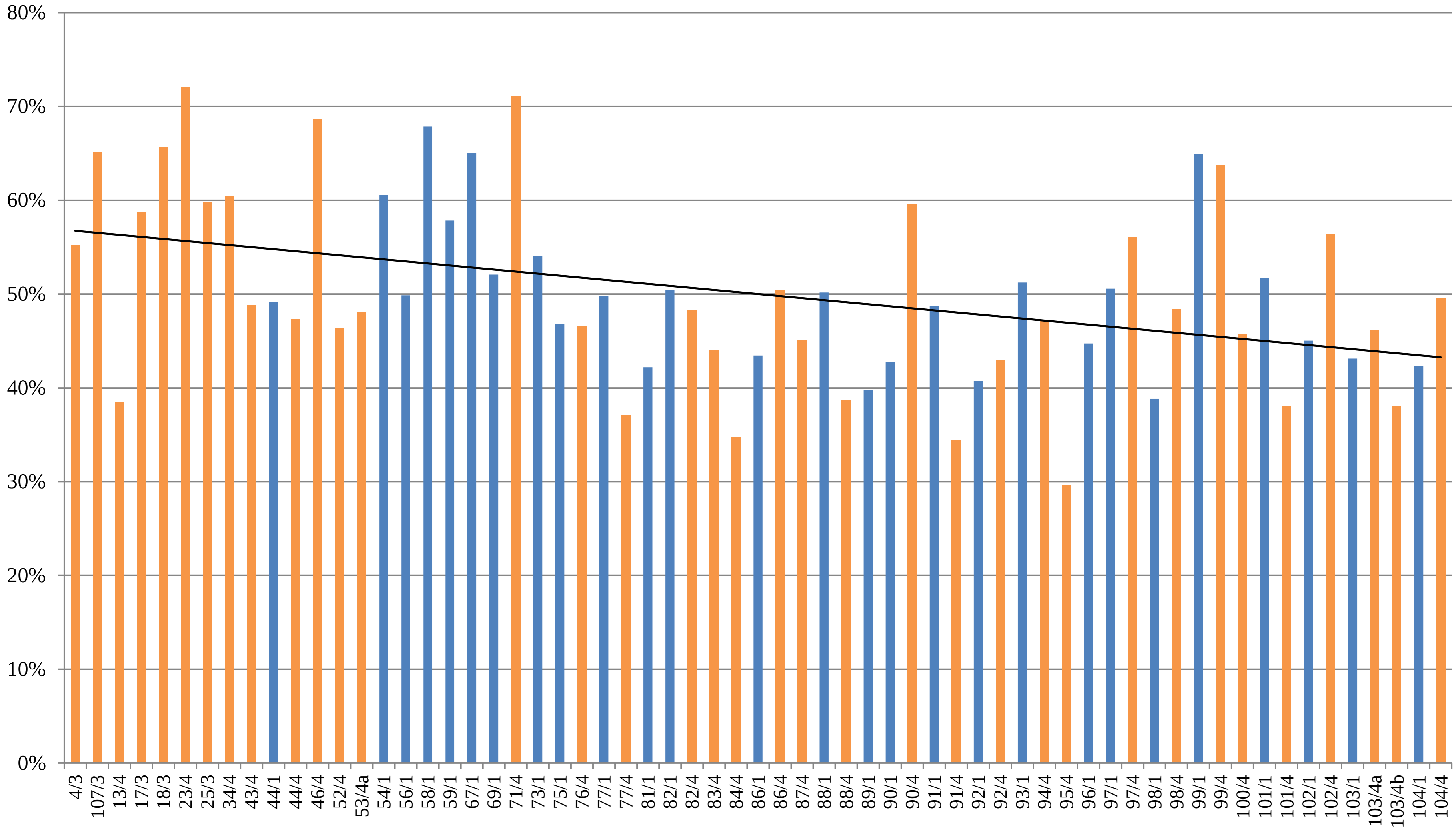
Having established the most- and least-conformant codas for the four parameters investigated in isolation, the final stage of the prototype investigation for the coda in Haydn's symphonies is to combine the data for the four parameters and to calculate the meta-prototypical coda. Table 5.11 summarises the most- and least-conformant codas for the four parameters investigated.

Table 5.11 – Most- and least-conformant Haydn codas with regard to the four parameters investigated.

Parameter	Most-Conformant Coda	Least-Conformant Coda
Structure	H/95/4	H/90/4
Harmony	H/95/1	H/23/4
Thematic Material	H/83/4	H/86/1
Instrumentation/Orchestration	H/83/4	H/54/1

So that the parameters receive equal weighting when the combined parameter prototype is calculated, the sum of the rank data is divided by the total number of individual parameters studied. For example, the sum of the rank data for structure is divided by two, because it is the sum of two individual parameters (raw coda length and proportional coda length). Figure 5.10 shows the percentage-point deviation from the combined parameter prototype for Haydn's codas.

Figure 5.10 – Deviation of Haydn's codas from the combined parameter prototype.



With the exception of the codas from H/90/4, H/99/1 and H/99/4, it appears that Haydn's codas *become more conformant with the prototype* over time. A test for correlation between the final percentage-point deviation from the prototype and time supports this observation. The results of the SRCT suggest a 99.9% significant moderate negative correlation (-0.41). This could constitute evidence that Haydn experimented (more consistently) with the organisation of the coda in his early symphonies, before adopting a more constant formula in the latter half of the 1780s. The percentage of movements less than 50 percentage-points (mean value) from the prototype is the same for both Haydn's first and final movements (63%). However, the three most conformant (H/84, H/91 and H/95) and the three least-conformant codas (H/23, H/46 and H/71) can all be found in the final movements of Haydn's symphonies. This suggests that not only do the final-movement codas provide a good template for a prototypical coda, but they also contain Haydn's most experimental codas. It should be noted, in support of the previous hypothesis, that the three least conformant, and perhaps most experimental codas, are located within the first 33% of Haydn's symphonic output.

5.5.1 The Most-Conformant Coda

H/95/4 is the most prototypical coda from the sample of symphonies. The coda from this movement ranks as the closest to the prototype for the structural proportions of the coda, the seventh most prototypical for the harmonic data, and the second for the use of instrumentation and orchestration. The only parameter for which H/95/4 is not a close prototypical example is the use of thematic material. For the thematic parameter, this coda ranks 30th, 50 percentage-points from the single-parameter prototype. This figure is explained by the higher percentage of CM and TM in the coda (18 percentage-points and 15 percentage-points from the prototype, respectively). A description of the coda from H/95/4, below, provides an outline of a prototypical Haydn coda.

Thirty-one bars in length and proportional to 13% of the movement, this coda opens with a five-bar LP (bb. 181–185) based on material from the EFS (b. 5 and b. 25). This material centres on the dominant with decreasing orchestration. The material is passed from the first violin, with string and woodwind chordal accompaniment (bb. 181–182^2), to the woodwind ensemble (bb. 182^4–184^1), before returning to unaccompanied first violin (bb. 184^4–185). From b. 186 the coda retraces the thematic material from the opening four bars of the exposition, increasing the orchestration to first violin, second violin and viola, whilst altering the harmonic accompaniment. With the passage of thematic material from the EFS retraced, the first passage of CM begins (b. 190). This is followed by six bars of TM (bb. 199–204) before a second, shorter, passage of CM (bb. 205–209) and two final bars of TM.

5.5.2 The Least-Conformant Coda

In comparison with H/95/4, H/23/4 contains the least-conformant coda. Constructed of only ten bars, proportional to 9% of the whole movement, this coda is ranked as the 13th least-conformant coda with regard to structural proportion data. Harmonically, this movement is the least conformant, with eight bars of tonic chord and two bars of silence. With regard to the thematic material, the coda ranks 55th from the prototype, containing only four bars of ECM and four bars of TM. Finally, this coda is also the least-conformant coda for the use of instrumentation and orchestration. With the exception of the first bar, the total percentage orchestration does not change and it is the only coda which does not conclude with a full orchestral *tutti*.

5.6 Changing Trends in Haydn's Coda

With the prototype established, and the most- and least-conformant codas identified with regard to this data, the following section, through the use of the SRCT, will highlight individual parameters which undergo change over time.

5.6.1 Structural Correlations

With regard to the changes in the structural parameters of Haydn's symphonies over time, the results of the SRCT indicate a 99.9% significant strong positive correlation (0.8) between the raw length of the coda and time. This result confirms a commonly accepted generalisation that *Haydn's codas increase in size over time*. However, although the codas do increase in raw length over time, the proportional relationship between the coda and the rest of the movement, on average, remains the same. The SRCT for proportional size against time suggests no correlation (-0.03). A selection of codas taken from the beginning, middle and end of Haydn's compositional output provides examples of these two correlations.

The coda from H/13/4 measures 26 bars, which is proportional to 15% of the movement. The coda from H/82/4, written *c.*23 years later is also proportional to around 15% of the movement. However, the raw length of the coda has increased by 19 bars. Finally, H/104/4, dated a further nine years after H/82/4, contains a coda 70 bars in length, but once again it is proportional to 15% of the whole movement. Given this diversity in the correlation data, it would appear that the proportional data is the set best used to describe the prototype. Haydn increases the raw length of the coda over time. However, on average, he maintains the same proportional size of the coda regardless of the raw length of the movement.

5.6.2 Harmonic Correlations

Given the large number of individual parameters investigated under the heading of harmony (use of tonic chords, use of dominant chords, chord diversity, harmonic gradient, etc.), there are only two which undergo significant statistical change across Haydn's symphonies. A 95% significant weak positive correlation (0.29) is identifiable for the chord diversity of the coda against time, which suggests that the codas become harmonically more diverse over time. However, a further 95% significant weak negative correlation (-0.26) exists between the use of tonic chords and time. This suggests that, although a wider diversity of chords may be present in Haydn’s later symphonies, the proportion of tonic chords in Haydn’s symphonies declines over time.

5.6.3 Thematic Correlations

With the exception of the weak positive correlation (0.27) between the diversity of thematic material used in the coda and time, which suggests that a greater variety of thematic material is used in Haydn’s later codas, no other significant relationships exist with regard to the thematic organisation of the coda and time.

5.6.4 Orchestration and Instrumentation Correlations

Although correlations exist for certain instruments over time regardless of their presence in a given movement (e.g., there is a 99.9% significant moderate positive correlation (0.56) for the use of clarinet when compared against time), these figures are not necessarily representative of the changes in coda orchestration. The figures are more likely to be reflective of instrument development, player availability and choice of tonic key. In the case of the clarinet, its later introduction into the symphonic orchestra means that it is not present in the first 51 codas in the sample. This is not a compositional decision by Haydn, but it will significantly alter the statistical results.

In order to achieve a true reflection of any changes in coda orchestration, only the relationship between the instrument and the works these instruments are present in is calculated (i.e., for the clarinet, the comparison sample is reduced from 63 to 9, because there are only nine codas containing the use of the clarinet). The results of this correlation testing suggest no significant changes in the use of individual instruments. However, the total percentage orchestration data over time produces a 95% significant weak negative correlation (-0.26). This result suggests that the overall orchestration of the coda reduces in size over time. This can clearly be seen by comparing the codas from the H/34/4 (97% total orchestration) and H/102/4 (64% total orchestration). H/34/4 contains almost orchestral *tutti* throughout the coda (bb. 97–108), with only three bars where the horns are removed (bb. 103–105). In comparison, H/102/4 contains numerous changes in orchestration, including solo first violin (b. 265), oboe and bassoon duet (b. 262), string ensemble (b. 284) and orchestral *tutti* (b. 299).

5.7 Summary

By using the data collected using the methodology in Chapter Two, Chapter Five has explored the structure and function of the coda in Haydn's first and final symphonic movements. Section 5.2 (p. 206) established a prototype for each of the four compositional parameters explored, identifying that:

- Haydn's codas average 31 bars in length, constituting, on average, 13% of the whole movement.
- Haydn's codas, on average, are constructed of seven chord types, consisting of 46% tonic harmony, 26% dominant harmony and 8% subdominant harmony. The remaining 23% are constructed of supertonic, submediant, diminished-seventh and secondary-dominant harmonies.
- Thematically, on average, Haydn's coda consist of 22% EFS, 17% ECM, and 38% CM and TM.
- The total orchestration of Haydn's codas averages 77%, with very little significant change in the orchestration throughout their duration.

As Section 5.3 (p. 211) has shown, and with the exception of the small variations in the use of thematic material and the use of the trumpet in the first and final movements, there appears to be no significant difference between the organisation of the coda in Haydn's first and final movements.

With the prototype established in Section 5.2, the most- and least-conformant codas for each of the individual parameters have been identified. Shown in Table 5.11, the methodology employed identified the codas in H/95/4, H/95/1, H/83/4 and H/83/4 as the most conformant for structure, harmony, thematic material and instrumentation/orchestration, respectively, and identified the codas from H/90/4, H/23/4, H/86/1 and H/54/1 as the least conformant, respectively. With regard to the spread of first and final movements from the prototypes, Section 5.4 (p. 220) identified that:

- A greater proportion of the first-movement codas is closer to the structural prototype than the final-movement codas.
- A greater proportion of the final-movement codas is closer to the harmonic prototype than the first-movement codas.
- A greater proportion of the first-movement codas is closer to the thematic material prototype than the final-movement codas.
- A greater proportion of the first-movement codas is closer to the instrumentation/orchestration prototype than the final-movement codas.

As the examples in this chapter have identified, it appears that a number of underlying standard procedures exist in Haydn's codas. Section 5.4 identified that:

- A longer coda is often balanced by a smaller recapitulation. The coda appears to adopt, in part, the role of the recapitulation, restating the key EFS material and then creating closure through the use of emphatic chords and cadences.
- If the opening material of the coda is harmonically active, with a faster harmonic rhythm, then the rate of harmonic rhythm is often slower towards the end of the coda, and vice versa.
- The shorter the absolute length of the coda, the larger the proportion of tonic chords, the smaller the proportion of dominant chords, and the faster the average harmonic rhythm.

- Although not as standardised as the progression of thematic material in the exposition, an underlying format for coda thematic organisation does appear to exist in the coda, namely ECM–EFS–CM–TM.
- As the codas become longer,
    - the proportion of EFS and ECM increases,
    - the proportion of CM and TM decreases,
    - the use of ETM, ESS and DM increases,
    - the thematic diversity increases.
- CM and TM are almost always orchestrated as a full *tutti*, whilst the material from the exposition or development either reflects the original orchestration used or contains smaller more diverse levels of orchestration.

As discussed in Section 5.5 (p. 243), by aggregating the data for all the parameters (Table 5.11), it is possible to identify the meta-prototypical coda for Haydn's symphonic first and final sonata-allegro and sonata-rondo movements. In addition to identifying H/95/4 as the most-conformant coda and H/23/4 as the least-conformant coda, Section 5.5 identified that:

- Haydn's codas *become more conformant with the prototype* over time, suggesting that Haydn experimented (more consistently) with the organisation of the coda in his early symphonies, before adopting a more constant formula in the latter half of the 1780s.
- The percentage of movements less than 50 percentage-points from the prototype is the same for both Haydn's first and final movements.
- The three most-conformant codas (H/84/4, H/91/4 and H/95/4) and the three least-conformant codas (H/23/4, H/46/4 and H/71/4) occur in the final movements, suggesting that not only do the fourth movement codas provide a good template for a prototypical coda, they also, paradoxically, contain Haydn's most experimental codas.

Although the correlation data presented in Section 5.6 (p. 246) suggest that, over time, the coda becomes larger (raw length), chord diversity increases, the use of tonic chords decreases, thematic material diversity increases, and total percentage orchestration decreases, the general lack of identifiable correlations suggests that Haydn's coda, with regard to the parameters investigated, do not statistically change over time. Furthermore, with the exception of the raw length of the coda, the correlations identified are weak, suggesting only small, gradual changes.

With the prototype established for the coda in the first and final movements of Haydn's symphonies, Chapter Six will explore the coda in the sample of movements by Mozart. By cross-referencing Chapter Six with the results of Chapter Five, it will be possible to identify similarities and differences between the organisation of the coda in Haydn's and Mozart's symphonic first and final movements.

Chapter Six – The Coda in Mozart's First and Final Symphonic Movements

6.1 Introduction

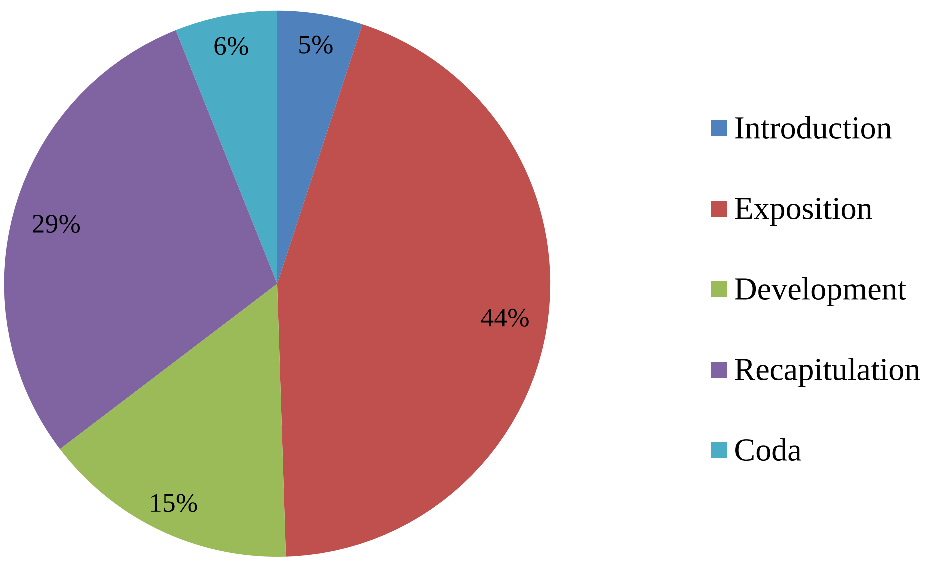
As outlined in Chapter Five, this chapter will establish the numerical prototypical data for the coda in the first and final movements of Mozart's symphonies. The prototypical data presented in this chapter is again a reduction of that collected for Mozart's codas and represents the structural proportions, harmony, thematic material, instrumentation and orchestration. This chapter identifies the most- and least-conformant Mozart coda for each of the compositional parameters, whilst identifying the most- and least-conformant coda representative of the whole Mozart sample. Although there did not appear to be many significant differences between the organisation of the coda in Haydn's first and final movements, this chapter will cross-compare the mean average data for the coda in Mozart's first and final movements to ascertain if this conclusion also applies to Mozart's coda. Section 6.5 will highlight any compositional parameters which undergo change over time. Chapter Six follows the same structural layout as Chapter Five. By using Chapter Five as a template, the reader is able to cross-compare the data and observations made here, with the data and observations made in Chapter Five. Section 6.2 outlines the prototypical data for the four investigated parameters of Mozart's codas.

6.2 Prototype Mozart Coda Data

6.2.1 Prototype Structural Proportions Data

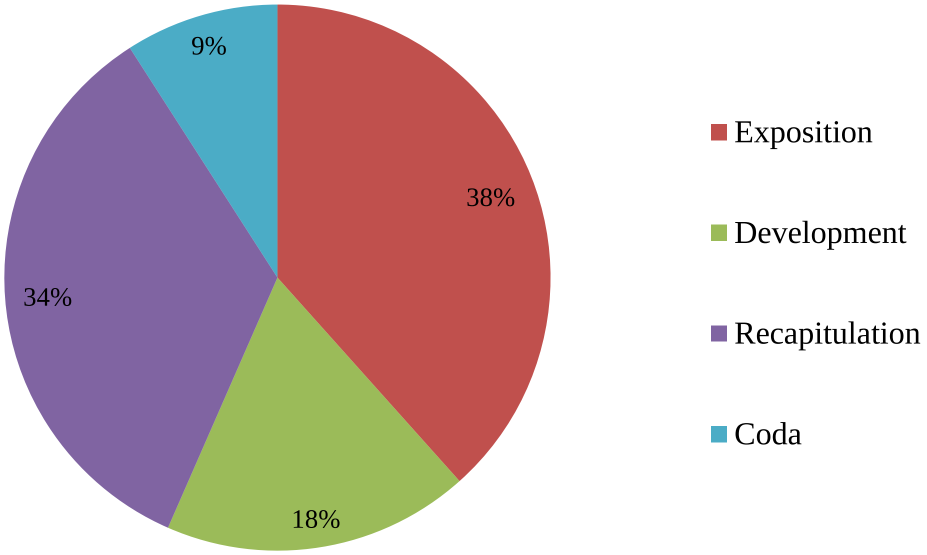
On average, the starting bar of Mozart's codas are identifiable by three criteria, with generally four applicable criteria (i.e., four criteria identify a candidate starting bar, but only three identify the same bar). Mozart's coda sections average 28 bars in length, constituting, on average, 9% of the whole movement. Given that to identify the source of the thematic material in the coda, it was again necessary to analyse the exposition and development section, it is possible to provide an average proportional length for the introduction, exposition, development, recapitulation and coda. The exposition is the largest section, proportionally 39%, on average, of the whole movement. In five of the 32 movements containing a coda an introduction is added. When added, this section constitutes, on average, approximately 5% of the movement. The development is the second smallest structural section, after the coda, proportional, on average, to 18% of the movement. The recapitulation, on average, is closer in size to the exposition and proportional to 33% of the movement. Figures 6.1 and 6.2 show the structural proportions in the prototype sonata-form first and final movements by Mozart. Figure 6.1 shows the average structural proportions for a movement containing an introduction, whilst Figure 6.2 shows the average structural proportions for a movement which does not contain an introduction.[31]

Figure 6.1 – Prototype structural proportions for the symphonic sonata-form first and final movements with introduction by Mozart.



[31] The differences between the proportions of a first and final movement are explored in Section 6.3.1.

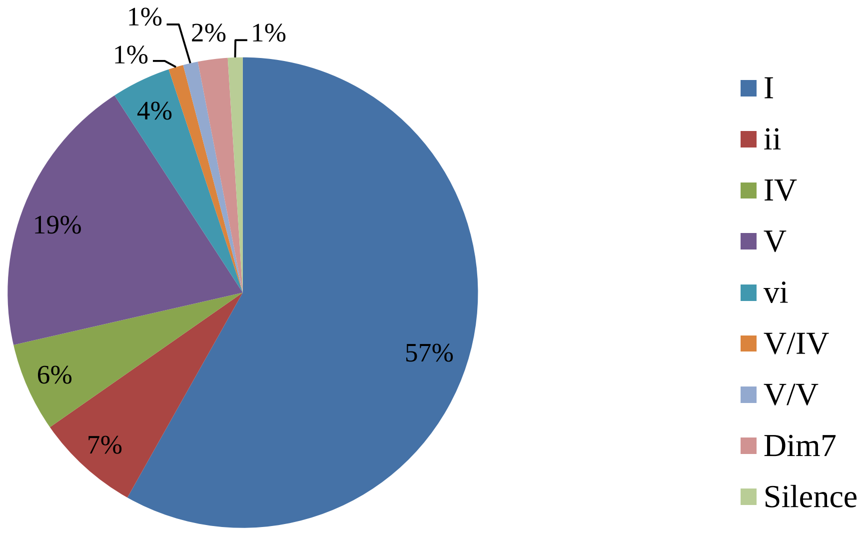
Figure 6.2 – Prototype structural proportions for the symphonic sonata-form first and final movements without introduction by Mozart.



6.2.2 Prototype Harmonic Data

Mozart's codas contain, on average, a proportion of tonic chords equivalent to 57% of the coda. This is by far the most common harmony found in the coda, with the dominant chord being the second most common (19%), and the supertonic the third (7%). On average, the remaining 17% of the coda is constructed of subdominant, submediant, diminished-seventh and secondary-dominant harmonies. The average proportion of tonic chords in Mozart's codas is the largest in comparison with Haydn and Beethoven. The harmonic rhythm of Mozart's coda averages 1.35 (i.e., Mozart's codas average 1.35 chords per bar), 0.11 chords per bar slower than the average per bar in Haydn's codas. Figure 6.3 shows the harmonic proportions in the prototype symphonic sonata-form first- and final-movement coda by Mozart.

Figure 6.3 – Prototype chord proportions for the symphonic sonata-form first- and final-movement codas by Mozart.



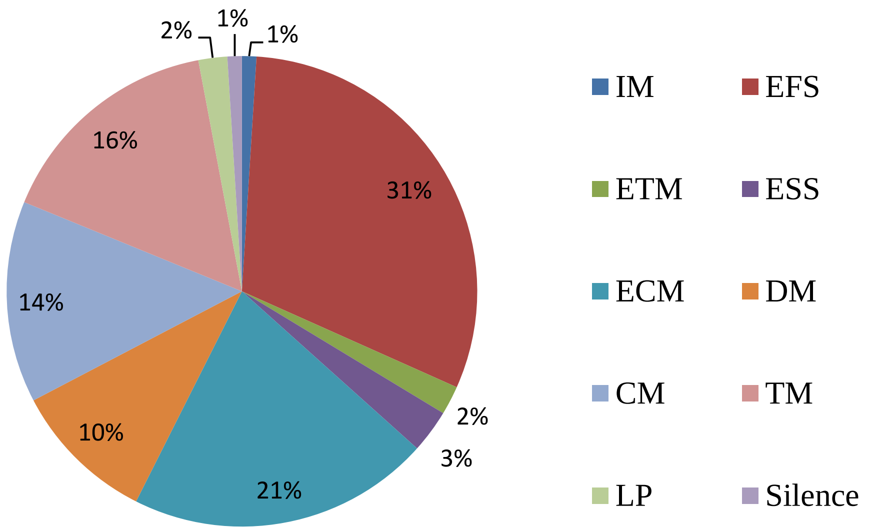
6.2.3 Prototype Thematic Data

The prototype suggests that Mozart's codas contain the largest proportion of ECM and TM across all three composer samples.[32] Combined, these two passages make up, on average, 37% of Mozart's codas. The remainder of the coda retraces or develops material from two primary sections. On average, 21% of the coda is constructed from material retraced from the EFS, with a further 10% of the coda comprising material which expands or develops the EFS. Interestingly, this percentage is similar to the use of EFS in Haydn's codas (Section 5.2.3, p. 208). The use of CM also features in Mozart's codas, constituting 14% of the coda. However, this is the smallest proportional use across all three composer samples. Figure 6.4 shows the thematic proportions in an average symphonic sonata-form first- and final-movement coda by Mozart. As with the study of Haydn's codas, to simplify the presentation of data, coda material which is based on an expansion or variation of material from earlier in the movement is

[32] As explained in Section 2.4.3 (p. 76), IM = Introduction Material, EFS = Expositional First Subject, ETM = Expositional Transition Material, ESS = Expositional Second Subject, ECM = Expositional Closing Material, DM = Development Material, CM = Cadential Material, TM = Tonic Material, LP = Link Passage, DMM = Different Movement Material.

grouped together with coda material which repeats almost directly material from earlier in the movement (e.g., material from the ECM and material expanded from the ECM).

Figure 6.4 – Prototype thematic organisation of the symphonic sonata-form first- or final-movement codas by Mozart.

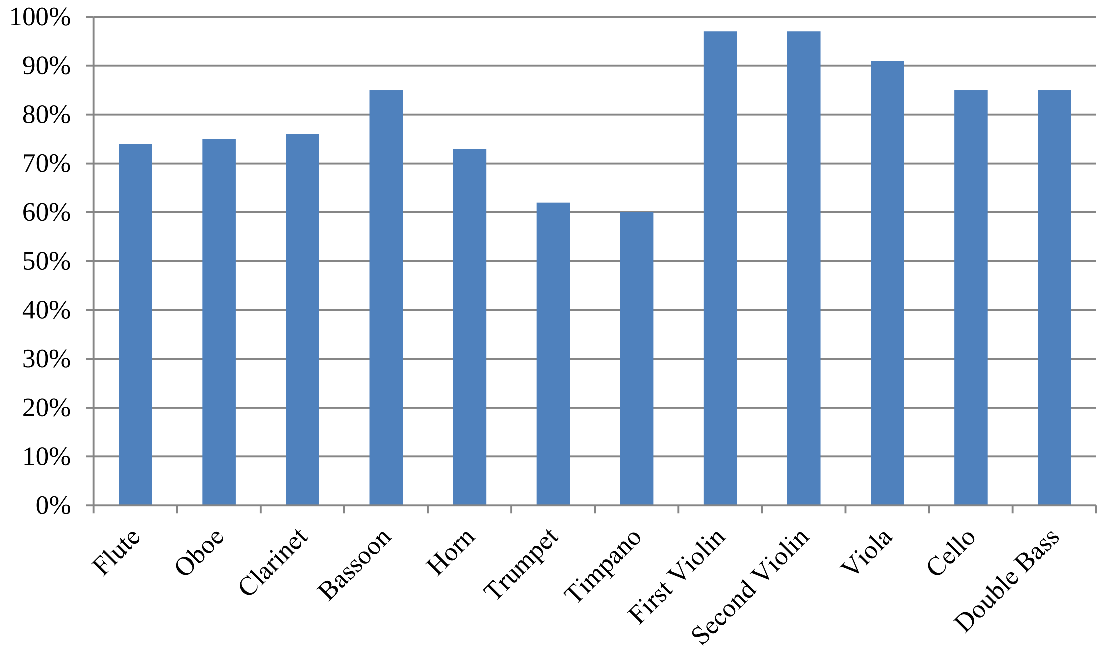


Although not occurring in all codas, where there is repetition of material within the coda (e.g., repetition of cadential gestures), this, on average, constitutes 13% of the coda. This figure is the largest of all three composers and is more than double the percentage found in Haydn's codas. Both Haydn and Mozart include IM in their coda sections. However, unlike Haydn's codas, where a small number (6%) contain material from the introduction, in Mozart's codas this use of IM can only be found in M/250/1 (bb. 259–265).

6.2.4 Prototype Instrumentation and Orchestration Data

With regard to the use of instrumentation and orchestration in Mozart's codas, the prototype for the total percentage orchestration averages 81% (i.e., on average 81% of the instruments are sounding at any one time in the coda), with very little change as the coda progresses in the number of instruments deployed. This is reflected in the orchestration gradient, which measures 0.014, the same as that for Haydn's codas. The instrumentation of the coda is naturally determined by the movement to which it is attached. The most common instrumentation (mode average) for Mozart's codas is two oboes, two bassoons, two horns, two trumpets, two timpani, first and second violins, violas, cellos and double basses. Although not present in the mode average instrumentation, there are a number of examples in Mozart's symphonies which incorporate two flutes (e.g., M/184/3), and two clarinets (e.g., M/297/1). Figure 6.5 shows the average instrumentation proportions in the sample.

Figure 6.5 – Prototype use of instrumentation in symphonic sonata-form first- and final-movement codas by Mozart.



6.3 Comparison of the First and Final Movement Prototype Codas

In Chapter Four the question 'Do composers construct the coda differently depending on the movement to which it is attached?' was asked. With the average data collected for all Mozart codas, the sample can be divided into first- and final-movement codas and the data compared to determine whether or not any significant differences are present. A difference between the first and final movement is regarded as significant if the prototype data for either movement diverges more than five percentage-points from the combined prototype data. If numerous significant differences are present between the two movement samples, then it will be necessary to explore and identify the prototypical coda with regard to the first and final movements separately.

6.3.1 Structural Proportions

Based on the data collected for the size of Mozart's codas, the structural proportions of movements which contain a coda, and the number of criteria used to identify the coda, a number of comparisons can be identified. Table 6.1 provides a comparison of the average proportional data for the coda in the first and final movements of Mozart's symphonies, to be read in conjunction with the combined movement prototype shown in Figures 6.1 and 6.2.

Table 6.1 – Comparison of the prototype structural data for the codas in Mozart's first and final movements.[33]

	Proportional Size of Movements (%)		
	First Movement Prototype with Introduction	First Movement Prototype without Introduction	Final Movement Prototype
Introduction	6	n/a	n/a
Exposition	44	41	37
Development	15	17	19
Recapitulation	28	34	34
Coda	7	9	10

	Number of Criteria	
Criteria applicable to the identification of the coda	3	4
Criteria eligible for the identification of the coda	2	3

As can be seen from Table 6.1, there are certain differences between Mozart's first movements which contain a coda and the final movements which contain a coda. Although the recapitulation broadly maintains its proportional size, both the development and coda are proportionally larger in the final movements than in the first movements, whilst the exposition

[33] Given that the percentages found in this chapter are presented to zero decimal places, the combined totals (e.g., the addition of all five structural sections) may not equal 100%.

section is larger in Mozart's first movements. From observation of this data, it would appear that in Mozart's final movements a proportionally larger coda section is balanced by a proportionally smaller exposition section. Further correlation testing, using SRCT (Section 2.6 p. 87), supports this observation, identifying a 99.5% significant moderate-strong negative correlation (-0.61) between the final movement exposition and coda. This indicates that as the proportional length of the coda increases, the proportional length of the exposition decreases, or vice versa. In addition to this correlation, the test also identified a 99.5% significant moderate-strong negative correlation (-0.61) between the final-movement recapitulation and coda (i.e., as the proportional length of the coda increases the proportional length of the recapitulation decreases and vice versa). Although not evident in Table 6.1, the correlation data suggest that a proportionally longer coda is balanced by a proportionally shorter exposition and recapitulation.

Interestingly, although, on average, the codas in the final movement of Mozart's symphonies are proportionally longer than those in the first movements, the longest coda in the sample is found in M/297/1 (proportional to 20% of the movement). This first-movement coda appears to be a structural anomaly, with the second, third and fourth proportional longest codas being found in M/385/4 (19%), M/181/3 (18%), and M/320/3 (16%).[34] Furthermore, the two joint-second longest first-movement codas, found in M/182/1 and M/338/1, are nine percentage-points smaller than the coda in M/297/1.

In addition to the size of the coda, the average number of criteria applicable for the identification of the start of the coda is fewer in the first movement than it is in the final movement. On average, only two criteria are eligible to identify the starting bar of the coda in Mozart's first movements, whereas three are eligible for coda identification in the final

[34] It should be noted that the second and third longest final-movement codas are located in sonata-rondo movements. This supports the suggestion in Section 5.4.1 (p. 229) that sonata-rondo codas are generally longer than sonata-allegro codas.

movements. Not only are Mozart's codas in the final movements proportionally larger, but they are also identifiable by a slightly larger range of different criteria.

As with the prototype data for the coda in Haydn, it is worth noting that the differences between the movement averages are not substantial, with the largest difference, between the proportions of the exposition section in the first and final movements, only totalling four percentage-points. Although there are exceptions, on average the codas of the first and final movements are almost equal with regard to their structural proportions.

6.3.2 Harmonic Data

As with the structural proportions of the coda in the first and final movements of Mozart's symphonies, the harmonic data collected shows no significant differences between the two movements. Table 6.2 provides a comparison of the average harmonic data for the coda in the first and final movements of Mozart's symphonies, to be read in conjunction with the combined movement prototype displayed in Figure 6.3.

Table 6.2 – Comparison of the prototype harmonic data for the codas in Mozart's first and final movements.

		Combined Movement Prototype	First Movement Prototype	Final Movement Prototype
Proportion (%)	I	57	58	56
	ii	7	8	6
	IV	6	5	7
	V	19	18	19
	vi	4	4	3
	V/IV	1	1	1
	V/V	1	1	1
	Dim7	2	1	3
	Silence	1	1	1

Chord Diversity	6	6	6
Harmonic Rhythm (per bar)	1.35	1.38	1.32

Chord Proportions

As the data show, there is very little difference between Mozart's first and final movements in the percentage usage of chords. The largest percentage-point difference (2%) can be found between the presence of tonic, supertonic, subdominant, and diminished-seventh harmony in the first and final movements. From observation of the prototype data for the first and final movements, it would appear that the slight reduction of tonic and supertonic harmony in Mozart's final-movement codas is balanced by an increased presence of subdominant, dominant and diminished-seventh harmony. However, as with the structural proportions of Mozart's first and final movements, the percentage-point difference between the chord use data is not substantial. Although there are exceptions, on average the codas of the first and final movements are almost equal with regard to chord use on these measures.

Harmonic Rhythm and Chord Diversity

Similar to chord use, there is very little difference between Mozart's first- and final-movement codas in the harmonic rhythm and no difference in the average chord diversity. Based on the two movement prototypes (Table 6.2), it is concluded that the codas in Mozart's final movements have a slower harmonic rhythm than those of the first movements. However, the difference between these two values is too small (+/-0.06) to warrant a significant difference between the first and final movements.

6.3.3 Thematic Material Data

In comparison to the prototype data calculated for the structural and the harmonic proportions for the coda in the first and final movements of Mozart's symphonies, the prototypes calculated for the use of thematic material do show some variation between the two movements. The most noteworthy differences can be found in the use of EFS, DM and TM. Table 6.3 provides a comparison of the prototype thematic material data for the coda in the first and final movements of Mozart's symphonies, to be read in conjunction with the combined movement prototype shown in Figure 6.4.

Table 6.3 – Comparison of the prototype thematic material data for the codas in Mozart's first and final movements.

		Combined Movement Prototype	First Movement Prototype	Final Movement Prototype
Proportion (%)	IM (where applicable)	1	2	n/a
	EFS	31	28	36
	ETM	2	2	2
	ESS	3	1	4
	ECM	21	18	21
	DM	10	14	6
	CM	14	14	14
	TM	16	20	14
	LP	2	1	3
	Silence	1	1	1
	Thematic Diversity	3.5	4	3

As can be seen from Table 6.3, there appears, on average, to be an equal amount of CM (14%:14%) and ETM (2%:2%) used in the coda in Mozart's first and final movements. However, with regard to material taken from other sections of the exposition and development, it appears that Mozart's first- and final-movement codas are more diverse. There is a three percentage-point difference in the use of ECM and a six percentage-point difference in the use of TM in the first movements. DM, on average, constitutes 6% of the coda in Mozart's final movements, eight percentage-points less than in the first-movement codas. However, it is the difference in the use of EFS which is most significant. In comparison with the first movement, on average, eight percentage-points more of the final-movement coda is made up of material taken from the EFS.

To draw a comparison with the data collected in Section 3.1.3 (p. 106) regarding the identification of the coda through restated development material, it is interesting to note that, although on average, Mozart's first- and final-movement codas comprise 14% and 6% DM, respectively, only 19% of codas in Mozart's symphonic sample are identified using criterion three. Although Mozart's codas, on average, contain restated DM, this material is not often located at the start of the coda. Only 9% of the codas in the sample begin with DM.

Finally, the increased proportion of TM in Mozart's first-movement codas could relate to the small increased proportion of tonic harmony discussed in Section 6.3.2 (p. 261). However, an applied correlation test reveals no significant correlation between the use of TM and the proportion of tonic harmony in Mozart's first-movement codas.

6.3.4 Instrumentation and Orchestration Data

In general, the instrumentation and orchestration of Mozart's first- and final-movement codas appear to be fairly consistent, with only a few identifiable differences. Table 6.4 provides a comparison of the average instrumentation and orchestration data for Mozart's codas, to be read in conjunction with the combined movement prototype shown in Figure 6.5.

Table 6.4 – Comparison of the prototype instrumentation and orchestration data for the codas in Mozart's first and final movements.

		Combined Movement Prototype	First Movement Prototype	Final Movement Prototype
Proportion (%)	Flute	74	73	74
	Oboe	75	77	74
	Clarinet	76	85	67
	Bassoon	85	89	81
	Horn	73	73	73
	Trumpet	62	67	57
	Timpano	60	63	58
	First Violin	97	95	98
	Second Violin	97	95	98
	Viola	91	89	93
	Cello	85	88	83
	Double Bass	85	88	82
Total Percentage Orchestration (%)		81	84	80
Orchestration Gradient		0.014	0.02	0.01

As can be seen from Table 6.4, there is a significant 18 percentage-point difference between Mozart's first and final movements in the use of the clarinet, a notable eight percentage-point difference in the use of the bassoon, and a significant ten percentage-point difference in the use of trumpet. Based on the prototypes, and with the exception of the flute, there appears to be, on average, a slightly larger proportion of woodwind instruments present in Mozart's first-movement codas than in the final-movement codas. However, in comparison, and with the exception of the cello and double bass, there appears to be a greater proportion of string instruments present throughout the final-movement codas. It is worth noting that, although these differences are highlighted in Table 6.4, no statistical correlation exists between the deployments of these two instrumental families. Therefore, there is no evidence to suggest that a preference or pattern exists for the orchestration of Mozart's codas in the first and final movements.

In comparison with the data presented for Haydn in Table 5.4 (Section 5.3.4, p. 218), which identified a greater proportion of trumpet use in Haydn's final-movement codas, the data presented in Table 6.4 shows that there is an increased proportion of trumpet in Mozart's first-movement codas. As with Haydn's use of the trumpet, a SRCT between Mozart's use of the trumpet and the use of TM reveals a 95% significant weak positive correlation (0.29). Although the tests for correlation do not suggest or detect causality, the results of the correlation test do support the hypothesis suggested in Section 5.3.4, that the larger proportion of TM in a movement's coda – in the case of Mozart, the first movement – allows for an increased use of the trumpet, which is restricted, normally, to the tonic-key harmonic series. Furthermore, applying the correlation testing to all the structural, harmonic and thematic parameters investigated reveals three further significant and stronger correlations. Firstly, and not surprisingly, there is a 95% significant weak-moderate correlation (0.34) between the use of tonic chord and the use of trumpet. Secondly, there is a 95% significant weak-moderate correlation (0.33) between the proportional size of the coda and the use of the trumpet. This correlation suggests that the greater the proportion of the coda in the movement, the increased presence of the trumpet. The third correlation exists between the use of the trumpet and the proportion of ESS. The 95% significant negative weak-moderate correlation (-0.30) which exists between these two parameters suggests that the trumpet is not active in the coda when ESS material is present. With the exception of M/551/4, there are no codas in Mozart's sample which contain ESS material and the use of the trumpet.

Perhaps the most interesting of the differences between the first and final movements is in the use of the clarinet. This, in Mozart's first movements is, on average, larger than the use of flute and oboe. However, in Mozart's final movements, this average percentage falls 18 percentage-points. Although there is generally a smaller orchestration in Mozart's final movements – which is reflected in the total percentage orchestration data – this does not explain the large percentage-point difference between the uses of the clarinet across these two movements.

This is the greatest difference between a regularly used foreground instrument in the first- and final-movement codas by all three sample composers. The explanation for this large percentage-point gap does not necessarily come from a purposeful design of the coda, but from the lack of examples present in the 32-movement Mozart sample which contain clarinet. With the clarinet only present in three first- and three final-movement codas (M/297/1, M/385/4, M/543/1, M/543/4, M/550/1b and M/550/4b), the averages are reflective of these four works and not, for example like the bassoon, reflective of a larger sample. Furthermore, given the development of the clarinet and its introduction in the orchestra, it is possible that the small sample data presented reflects extreme uses of the clarinet (i.e., examples of Mozart foregrounding the clarinet). Interestingly, the data for M/543, which contains codas with clarinet in both the first and final movements, mirror the average data presented in Table 6.4. In M/543, the clarinet is present in a larger proportion of first-movement coda, 15 percentage-points more than in the final-movement coda.

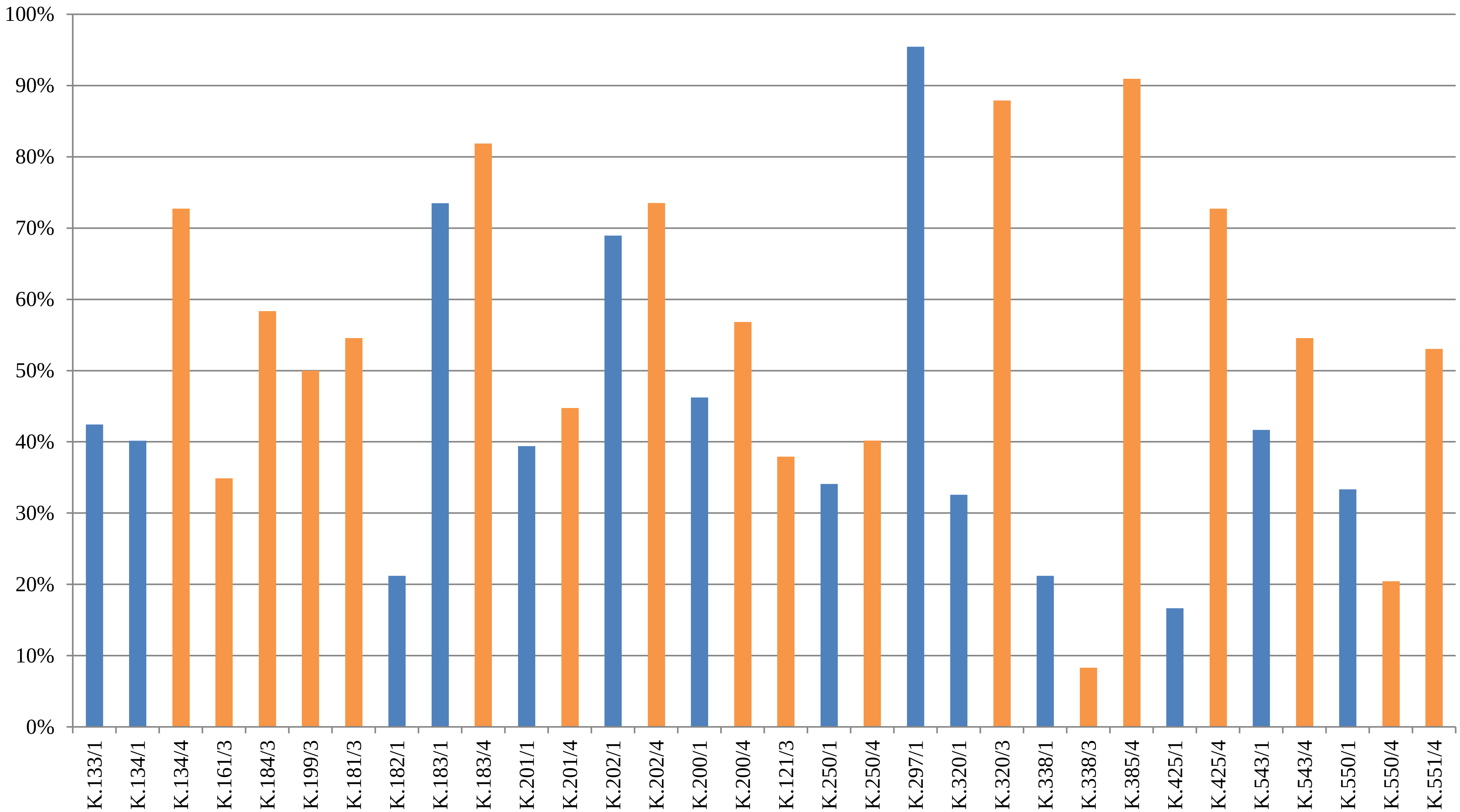
6.4 Parameter Prototypical Codas

With the prototype for each of the parameters established, Section 6.4 is concerned with the deviation of Mozart's codas from the identified prototypes: i.e., how far Mozart's codas are, numerically, from the prototype. Are the codas good examples of the prototype or are there numerical anomalies? Because Section 6.3 (p. 258) has revealed few significant differences between Mozart's codas in the first and final movements, codas from both movements will be compared against the combined average prototype. This process will identify codas which align with the prototype, including the most-conformant coda, whilst also identifying and exploring any codas which represent significant numerical anomalies. Although the first and final movements do not appear to have any significant differences *between* them with regard to their organisation, the data in this section will identify if there is a greater deviation in coda organisation from the prototype *within* either the first or final movements (i.e., although the parameter averages for the first- and final-movement codas are broadly the same, the range of the data may be different).

6.4.1 Spread of Codas with regard to the Structural Proportions Prototype

The figures presented in this section represent the ranking of the absolute and proportional length of the coda with regard to the movement to which it is attached. Figure 6.6 shows the percentage-point deviation from the prototype for the structural proportions (Figures 6.1 and 6.2) of Mozart’s codas. The blue bars represent the first-movement codas, whilst the orange bars represent the final-movement codas. The larger the percentage, the greater the distance from the prototype the coda is situated. The vertical baseline (0%) represents the prototype.

Figure 6.6 – Deviation of Mozart's codas from the structural prototype.



The Codas Most Conformant to the Structural Prototype

From the data in Figure 6.6, M/338/3 is calculated as the most conformant to the prototype. At 28 bars long, not only is the raw length of the coda equal to the length of the prototype, but the coda is also proportional to 9% of the movement. The proportions for the rest of the movement are also very similar to the prototype. M/338/3 does not include an introduction and so is compared to Figure 6.2. The development and recapitulation section are only four and two percentage-points smaller, respectively, than the prototype and the exposition is six percentage-points larger. Overall, structurally, M/338/3 is a strongly conformant example of the prototype data (Figure 6.2).

Interestingly, the second most-conformant coda, M/425/1, which is 23 bars long, and which is also proportional to 6% of the movement, contains a different structural weighting. It contains an introduction and is therefore compared against the prototype from Figure 6.1. Both the proportional sizes of the introduction and coda match the prototype. The development and recapitulation are five and three percentage-points smaller, respectively, than the prototype. However, the largest percentage-point difference is found in the exposition. The exposition is nine percentage-points larger than the prototype. Regardless of these differences, M/425/1 is still a closely conformant example of the prototype (Figure 6.1).

With regard to the conformity of the first and final movements to the prototype, the spread of the data in Figure 6.6 shows that there are a greater proportion of conformant first movements than final movements. Seventy-nine percent of the first-movement codas are within 50 percentage-points (mean) of the prototype, in comparison with only 39% of the final-movement codas. In addition to this, there is a larger range (83 percentage-points) between Mozart's most- and least-conformant final-movement codas.

The Codas Least Conformant to the Structural Prototype

Figure 6.6 identifies M/297/1 as the least-conformant coda with regard to the structural proportions. In comparison with the prototype, this coda is significantly larger both in absolute and relative terms. The coda is 58 bars long and is 20% of the whole movement. Observation of the structural proportions of this movement suggests that to accommodate a larger coda the recapitulation is reduced in size. Analysis of the next two non-conformant examples and correlation testing of the structural proportions proves that this is a trend common to Mozart's symphonic first and final movements.

M/385/4 (the 31st coda from the prototype) and M/320/3 both contain proportionally large codas. The coda of M/385/4 is proportional to 19% of the movement, making it only one percentage-point smaller than the least-conformant coda. To accommodate this larger coda, the exposition and recapitulation are both four and five percentage-points smaller, respectively, than the prototype. However, the development remains equal to the prototype (18%). A similar structure can be found in M/320/3, with one exception. In this movement, both the development and coda are larger than the prototype (12 and 7 percentage-points, respectively). Again, as with M/385/4, these augmented sections are balanced by a reduction in the proportional size of the exposition and recapitulation (nine percentage-points) in comparison with the prototype.

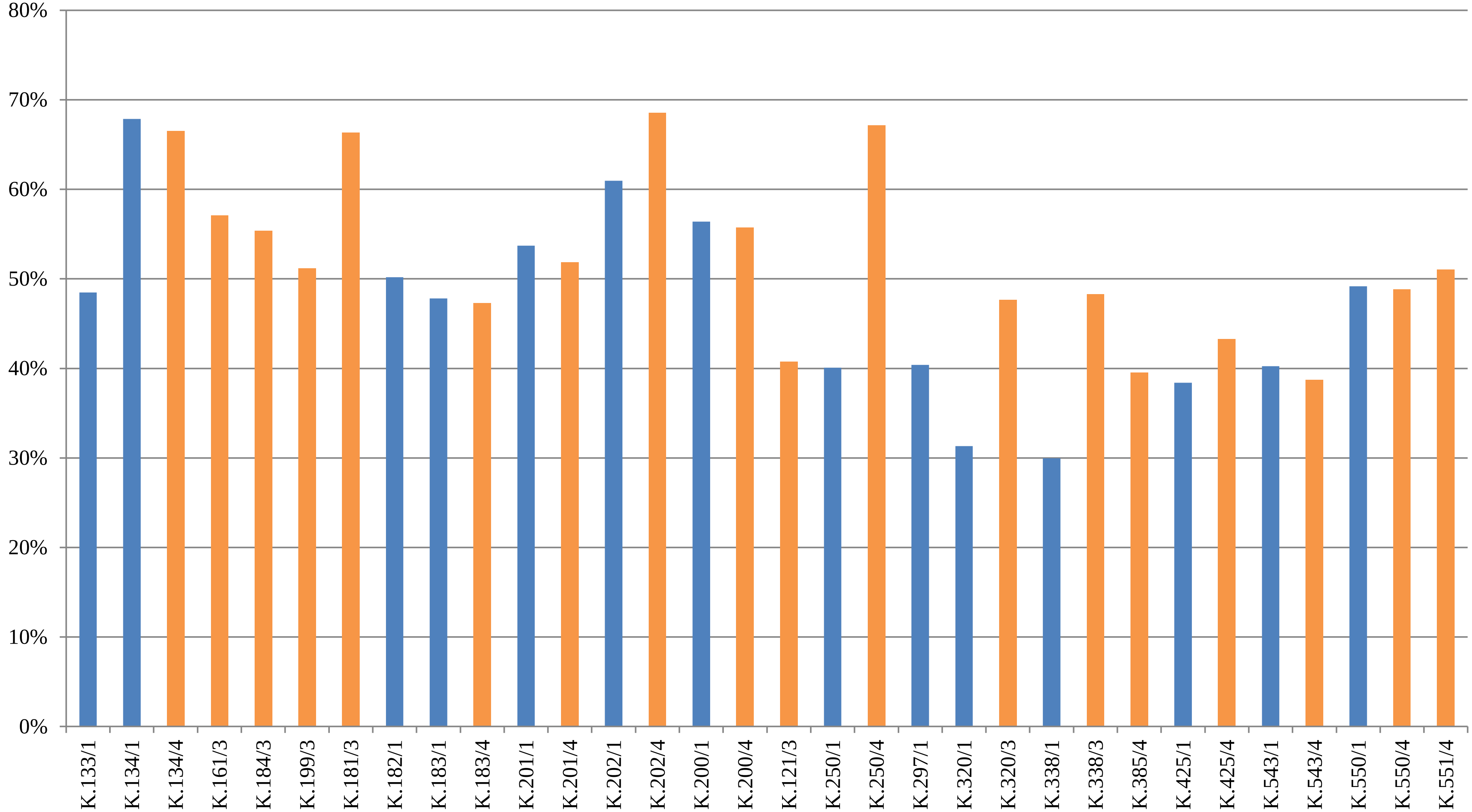
Applying the SRCT further reinforces the relationship between the size of the recapitulation and the coda. When the proportional size of every coda is compared with its exposition, development and recapitulation, two significant correlations are identified. The SRCT identifies a 99.5% significant moderate negative relationship (-0.45) between the size of the coda and the size of the recapitulation in Mozart's symphonies. In addition, there is also a 99.5% significant moderate negative relationship (-0.45) between the size of the coda and the size of the exposition. Both of these results suggest that as the coda increases in proportional size, the exposition and/or recapitulation are proportionally shortened to accommodate this expansion.

Another statistically extreme example provides a different view of the structural proportions of the coda. M/183/4, the 28th coda from the prototype, is identified not as an extreme because it is significantly *larger* than the average, but rather because it is significantly *smaller*. In this example, the coda is only eight bars in length and proportional to 2% of the movement. Further examples of codas which are significantly smaller than the prototype can be found in M/134/4 (11 bars, 4% proportionally), and M/183/1 (14 bars, 3% proportionally).

6.4.2 Spread of Codas with regard to the Harmonic Prototype

The figures presented in this section represent the ranking of each chord used, the chord diversity, the harmonic rhythm, and the harmonic gradient. Figure 6.7 shows the percentage-point deviation from the prototype (Figure 6.3) for the harmonic data of Mozart's codas. With regard to the harmonic organisation of Mozart's codas, M/338/1 is the most conformant to the prototype, whilst M/202/4 is the least conformant.

Figure 6.7 – Deviation of Mozart's codas from the harmonic prototype.



As with the structural proportions, with regard to the harmonic parameter, there is a greater percentage of first-movement codas conforming with the prototype than final-movements. Fifty-seven percent of the final-movement codas are located within 50 percentage-points (mean) from the prototype, whilst the figure is 14 percentage-points larger for first-movement codas. Table 6.5 identifies the most- and least-conformant codas for each of the aspects investigated with regard to the harmonic parameter.

Table 6.5 – Most- and least-conformant Mozart codas for individual harmonic parameters.

Proportion of Chord:	Most-Conformant Coda(s)	Least-Conformant Coda(s)
I	M/425/1	M/161/3
ii	M/320/1	M/425/1
IV	M/182/1	M/320/3
V	M/183/4	M/202/4
vi	M/338/3	M/202/1
V/IV	M/543/4	M/201/1
V/V	n/a	M/121/3
Dim7	M/425/1	M/183/4
Silence	n/a	M/250/1

Chord Diversity	M/183/1, M/183/4, M/201/4, M/320/1, M/338/1, M/550/4	M/543/4, M/551/4
Harmonic Rhythm	M/183/4	M/200/4
Harmonic Gradient	M/385/4	M/183/4

The Coda Most Conformant with regard to Chord Diversity

Although the most-conformant coda with regard to the harmonic data collected, M/338/1 is only the most prototypical example with regard to chord diversity. The prototype shows that Mozart's codas are constructed, on average, of six chord types, as in M/338/1. This coda includes tonic, dominant, subdominant, minor subdominant, submediant and supertonic chords.

The Coda Most Conformant with regard to the Chord Proportions

With regard to the individual proportions of chords, M/338/1, although ranking close to the prototype, contains ten percentage-points more tonic, three percentage-points fewer supertonic, one percentage-point more subdominant and six percentage-points fewer dominant chords than the prototype.

The Codas Most Conformant with regard to Harmonic Rhythm

The harmonic rhythm in Mozart's codas is, on average, 1.35 chords per bar. The coda of M/338/1 provides a good example of the prototypical harmonic rhythm in Mozart's codas. Second closest to the prototype (0.04 from the prototype and 0.01 from M/183/4, the most-conformant coda with regard to harmonic rhythm), the coda of M/338/1 averages 1.39 chord changes per bar. Constructed of EFS, CM, ECM and TM, the harmonic rhythm in this coda increases to two chords per bar during the ECM and CM (bb. 247–252). In addition to this, the EFS (bb. 237–246) contains a variable harmonic rhythm which ranges from one to four chords per bar. The tonic material, located at the end of the coda (bb. 253–264) is the only passage which is predominantly one chord per bar. However, there are still exceptions (bb. 261–262). This example suggests that the harmonic rhythm generally decreases towards the end of the coda, following an increase during the ECM and CM.

M/183/4 is the closest example to the prototype harmonic rhythm (1.38). Although a shorter coda than M/338/1, M/183/4 follows a similar pattern with regard to the harmonic rhythm. Constructed of DM, LP and CM, the coda begins with an increased harmonic rhythm. The DM (bb. 187–188) contains two chords per bar. The harmonic rhythm decreases towards the CM (bb. 191–194). With one final increase to two chords per bar (b. 192), the coda closes with a harmonic rhythm of one chord per bar.

Interestingly, although both prototypical examples suggest that the harmonic rhythm decreases towards the end of the coda where there is ECM, CM and/or TM, observation of the whole sample suggests that these categories of thematic passages are those where the harmonic rhythm increases the most. Although there are five examples of codas which are harmonically unchanging throughout – for example M/200/4 (harmonic rhythm: 2.00) and M/199/3 (1.00) – Mozart's codas can be broken down into the following three categories:

1. Of the 27 movements which contain a changing harmonic rhythm, in 12 movements, the harmonic rhythm increases in the ECM, CM and TM, for example, M/182/1.
    a. Of the 22 movements which contain CM, 36% contain CM with a fast harmonic rhythm. These passages of CM have the fastest harmonic rhythm of all the thematic material in these codas.
2. Of the remaining 15 movements which contain a changing harmonic rhythm, in 12, the harmonic rhythm varies across the numerous thematic cells, for example M/338/1.
3. Of the final three movements which contain a changing harmonic rhythm, the harmonic rhythm is the highest in the EFS, ESS and/or DM, for example M/202/1.

The Coda Most Conformant with regard to the Harmonic Gradient

The harmonic gradient of the coda in M/338/1 is 6th from the prototype. A gradient can be located between the range of +1 and -1 (Section 2.4.2, p. 76). Given that the gradients of Mozart's codas only have a small range of 0.1576 (-0.0424 to -0.2), it could be suggested that they follow a similar trend regarding the order of chords used. This is somewhat to be expected, as discussed in Section 4.2.4 (p. 173), because a key principle of the coda involves the section ending on the tonic. The variation in range (0.1576) is created through the diversity of chord progressions in the codas leading to the tonic, and the speed at which the coda progresses to the tonic.

The Codas Least Conformant with regard to the Harmonic Prototype

Calculated as the least-conformant coda, M/202/4 provides contrasting data for the harmonic organisation of the coda. Given that this coda is constructed primarily of tonic chords, the proportions of chords are significantly different from the prototype, with 15 percentage-points more tonic, seven percentage-points fewer supertonic, eight percentage-points more subdominant and five percentage-points fewer dominant chords. In addition to these points, this coda is ranked 27th with regard to chord diversity, being constructed of just tonic, subdominant and dominant chords. M/202/4 also ranks 12th with regard to the harmonic rhythm and 31st with regard to the harmonic gradient.

Two further non-conformant examples of the coda can be found in M/250/4 and M/134/1. The latter, in contrast with M/250/4, contains less tonic harmony (21 percentage-points), whilst also containing more dominant harmony (20 percentage-points). The second example, M/134/1, contains less tonic harmony than M/202/4 (four percentage-points). However, although not closely conformant with the prototype, the use of dominant harmony is more conformant (11 percentage-points). Where M/134/1 differs from both M/202/4 and M/250/4 is in the proportional use of submediant harmony. M/134/1 contains more submediant harmony (11 percentage-points). These examples are prototypical extremes not only because of the anomalous proportions of chord use, but also because of the significantly slower harmonic rhythm – both M/250/4 and M/134/1 contain an unchanging harmonic rhythm (1.0 per bar) – and lower chord diversity.

Harmonic Proportions and Raw Coda Length

By organising the codas into the upper, middle and lower tertiles with regard to their length, it is possible to identify the different harmonic proportions dependent on the length of the coda. Table 6.6 shows the average harmonic data for the three tertiles of codas, organised with regard to the raw length of the coda.

Table 6.6 – Tertile ranges showing the difference in coda harmonic organisation according to coda length.

	Raw Coda Length (bars)	Mean Average							
		Proportion (%)					Chord Diversity	Harmonic Rhythm	Harmonic Gradient
		I	ii	IV	V	vi			
Lower Tertile	1–18	64	4	7	14	5	5	1.35	-0.08
Middle Tertile	19–24	55	10	5	20	2	6	1.53	-0.04
Upper Tertile	25–68	53	6	7	21	4	7	1.25	-0.02

Table 6.6 shows that as the absolute size of Mozart's codas increases, the percentage of tonic harmony decreases and the proportion of dominant harmony increases. Interestingly, the harmonic rhythm is at its fastest in the middle tertile (codas with a raw length between 19 and 24 bars), with the upper tertile of coda containing the slowest harmonic rhythm. In addition, the harmonic gradient of Mozart's codas becomes weaker whilst, on average, the chord diversity increases from five to seven chords. These observations, combined with the reduction in the proportion of tonic chords, could suggest that, although still the conclusion of the movement, the primary focus of Mozart's upper-tertile codas is no longer to reinforce the tonic. As with the sample of Haydn's movements, the increased chord diversity may be explained by more diverse thematic material used in such codas.

6.4.3 Spread of Codas with regard to the Thematic Prototype

The percentages presented in this section represent the ranking of the different thematic material used (e.g., EFS, DM, and TM) and the thematic diversity (the number of thematic sources) in Mozart's codas. Figure 6.8 shows the percentage-point deviation from the prototype (Figure 6.4) for the thematic data of Mozart's codas. Across the parameters measured M/338/3 is the most conformant to the prototype (32 percentage-points from the prototype), whilst M/550/4 is the least conformant (65 percentage-points from the prototype). With regard to the spread of the codas from the prototype, there appears to be a slightly greater percentage of first-movement codas than final-movement codas conformant with the prototype. Fifty-seven percent of the first-movement codas are within 50 percentage-points (mean) of the prototype, seven percentage-points more than the final-movement codas.

Figure 6.8 – Deviation of Mozart's codas from the thematic prototype.

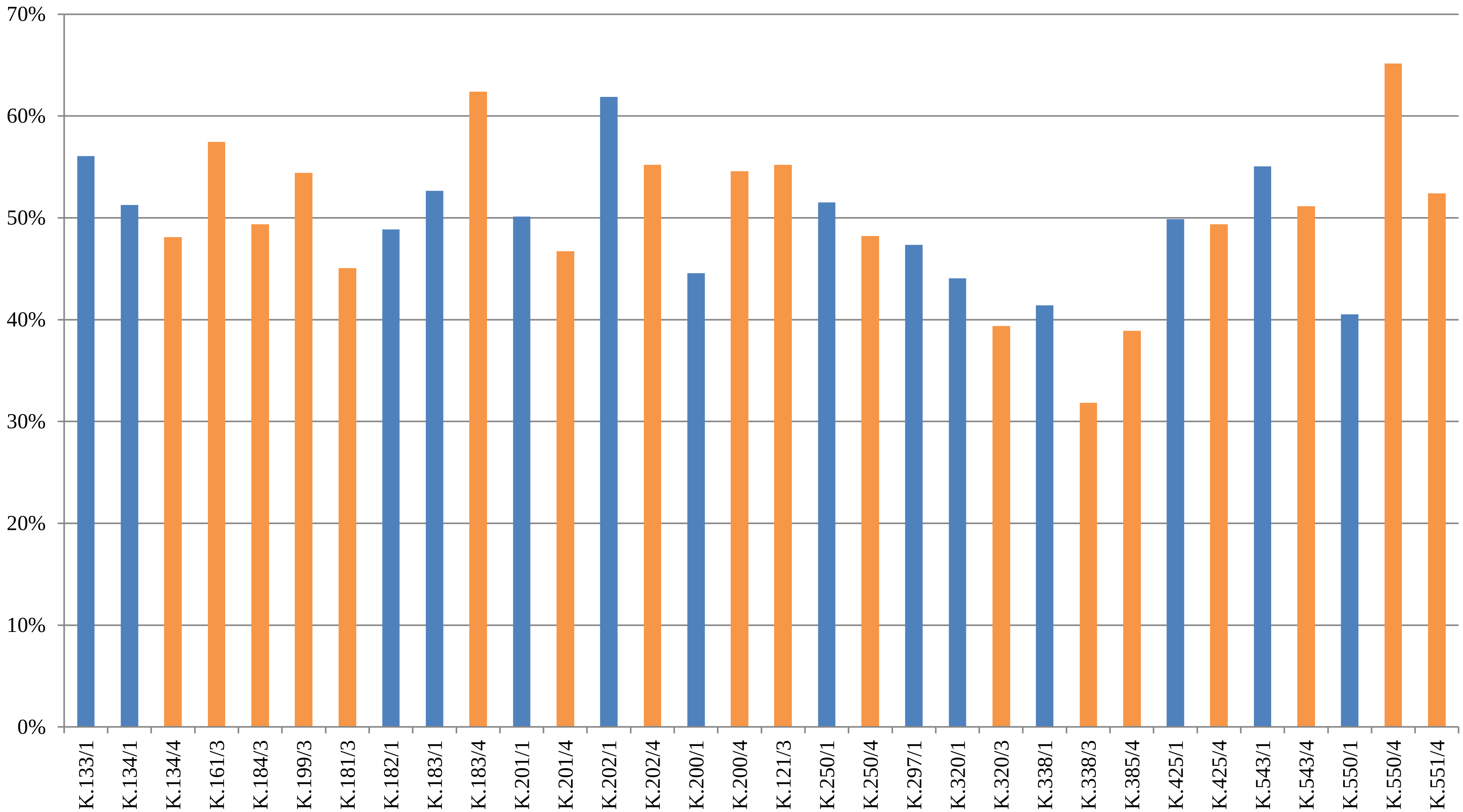


Table 6.7 shows the most- and least-conformant codas for each of the aspects investigated in the thematic parameters. Given the lack of Mozart codas which contain IM, ETM and ESS, there is no prototypical example for the use of these categories of thematic material.

Table 6.7 – Most- and least-conformant Mozart codas for individual thematic parameters.

Use of:	Most-Conformant Coda(s)	Least-Conformant Coda(s)
IM	n/a	M/250/1
EFS	M/134/1, M/550/1	M/200/4
ETM	n/a	M/201/4
ESS	n/a	M/121/3
ECM	M/425/1	M/543/4
DM	M/201/1	M/202/4
CM	M/320/3, M/338/3	M/183/4
TM	M/385/4	M/161/3
Thematic Diversity	M/199/3, M/181/3, M/182/1, M/201/4, M/121/3, M/250/4, M/297/1, M/320/1, M/320/3, M/385/4, M/543/1, M/543/4, M/550/1	M/250/1

The Coda Most Conformant with regard to the Proportions of Thematic Material

Although not containing the small proportional percentages of IM, ETM, ESS, LP and silence identified in the prototype (Figure 6.4), the coda from M/338/3 provides strongly conformant data for the use of EFS, ECM, DM, CM and TM. The differences in the proportions of thematic material in M/338/3 against the prototype are:

- EFS = -2 percentage-points,
- ECM = +8 percentage-points,
- DM = +4 percentage-points,
- CM = 0 percentage-points,
- TM = -2 percentage-points.

Although M/338/3 contains the most-conformant coda for the combined thematic sub-parameters, it is only the most-conformant coda for one of the sub-parameters in isolation, namely CM. With regard to use of EFS, M/134/1 and M/550/1 are more conformant. Observation of the positioning of EFS in the sample highlights some structural similarities with regard to the use of thematic material in Mozart's codas.

Use of Thematic Material in the Coda

Focused on the tonic, the material from the EFS in M/338/3 is positioned at the beginning of the coda (bb. 277–284). This is followed by a modified passage (bb. 285–288) of material from the opening of the development (bb. 135–138). Following four bars of CM, the coda ends with eight bars of material based on the ECM and four bars of TM.

Similar to M/338/3, M/425/1 also contains EFS, ECM, CM and TM. However, in contrast, the order of thematic material is different. The coda begins with four bars of ECM (bb. 265–268), which is followed by six bars of DM (bb. 269–274). After the statement of DM, the coda concludes with a passage of CM followed by a passage of TM. Given the proportion of elided codas (Section 4.3.3, p. 197) in Mozart's later codas, it is not surprising to see a larger proportion of these codas beginning with ECM. Twenty-eight percent of the whole Mozart sample begins with ECM.

A final example of the thematic organisation of Mozart's codas can be seen in M/297/1. In this example, the coda is constructed of the same types of thematic material found in the previous examples (EFS, ECM, CM and TM). However, instead of conforming to the thematic pattern identified in M/338/3 or M/425/1, a number of the thematic restatements appear at different points in the coda. In M/297/1, the coda begins with nine bars of ECM (bb. 238–246) taken from bb. 84–92 from the exposition. This is then followed by four bars of cadential material (bb. 247–250). This thematic pairing (ECM–CM) is then repeated from bb. 251–256. However, the ECM is retraced from a different passage from the exposition (bb. 105–108). After a repetition of bb. 238–256 (bb. 257–275), there is a passage of EFS (bb. 276–277) and another cadence (bb. 278–279). These two passages are again repeated (bb. 280–283), before the coda ends with twelve bars of TM (bb. 284–295).

At their core, the following thematic pattern can be found, with some subtractions (e.g., M/184/3) and additions (e.g., DM in M/338/3) in 60% of Mozart's codas: EFS–CM–ECM–TM. M/320/3 and M/338/1 are clear examples of this thematic pattern. [35] A further 9% of the codas in Mozart's sample contain the same thematic cells as found in M/338/3. However, the order in which these are presented is different. For example, in M/134/4, EFS is preceded by CM before closing with TM. And in M/425/1, where no EFS is present, ECM precedes both DM, and CM. Finally, the remaining 31% of codas are again constructed primarily of EFS, CM, ECM and TM, with some addition of ESS (e.g., M/199/3), and DM (e.g., M/320/1). However, not only does the order of thematic material differ from the pattern identified above in 60% of Mozart's codas, but, as discussed with regard to M/297/1, these codas also contain restatements of the same thematic material at different stages of the coda.

The Coda Least Conformant with regard to the Proportions of Thematic Material

Identified as the least conformant, the coda from M/550/4 contains no EFS or TM in the coda. Instead of a proportion of EFS, this coda contains one of the largest proportions of ECM (63%) and CM (37%) found in the Mozart sample, ranking 30th from the prototype for both sub-parameters. Although non-conformant with regard to the proportions of ECM and CM, and not containing material from the EFS, the coda from M/550/4 still resembles the thematic organisation of that in M/297/1. The coda of M/550/4 begins with ECM (bb. 285–292), which is followed by CM (bb. 293–301). The coda concludes with another statement of ECM (bb. 302–308). However, as with M/297/1, the material is taken from a different section (bb. 118–124 rather than bb. 109–114).

[35] In M/184/3 the identified pattern is maintained, but there is no passage of ECM. Therefore, the thematic organisation of M/184/3 is: EFS–CM–TM.

Thematic Proportions and Raw Coda Length

As with Haydn's codas, the absolute size of Mozart's codas affects the thematic material used. At only eight bars long, there is not space to incorporate large quantities of thematic material in the coda of M/183/4. Conversely, in a larger coda such as M/551/4, there is much more opportunity in the 68 bars available to incorporate larger amounts of thematic material from different sources. A comparison of the correlations between the raw length of the coda and the percentage of thematic material used shows a number of positive and negative trends. These are summarised in Table 6.8, which shows the average thematic data for the three tertiles of codas organised with regard to the raw length of the coda.

Table 6.8 – Tertile ranges showing the difference in coda thematic organisation according to coda length.

	Raw Coda Length (bars)	Mean Average					
		Proportion (%)					Thematic Diversity
		EFS	ECM	CM	TM	Other[36]	
Lower Tertile	1–18	26	10	16	26	22	3
Middle Tertile	19–24	30	24	18	8	20	4
Upper Tertile	25–68	35	25	12	14	13	4

As Table 6.8 shows, the upper tertile of codas (those over 25 bars in length) is constructed with a higher proportion of EFS and ECM. In comparison, the lower tertile (those under 18 bars in length) contains the largest proportion of TM and the second largest proportion of CM. As the codas increase in size, the proportions of EFS and ECM also increase. However, the proportions of CM, TM, IM, ETM, ESS and DM decrease. With the exception

[36] Given their generally reduced use, IM, ETM, ESS and DM are combined in this column.

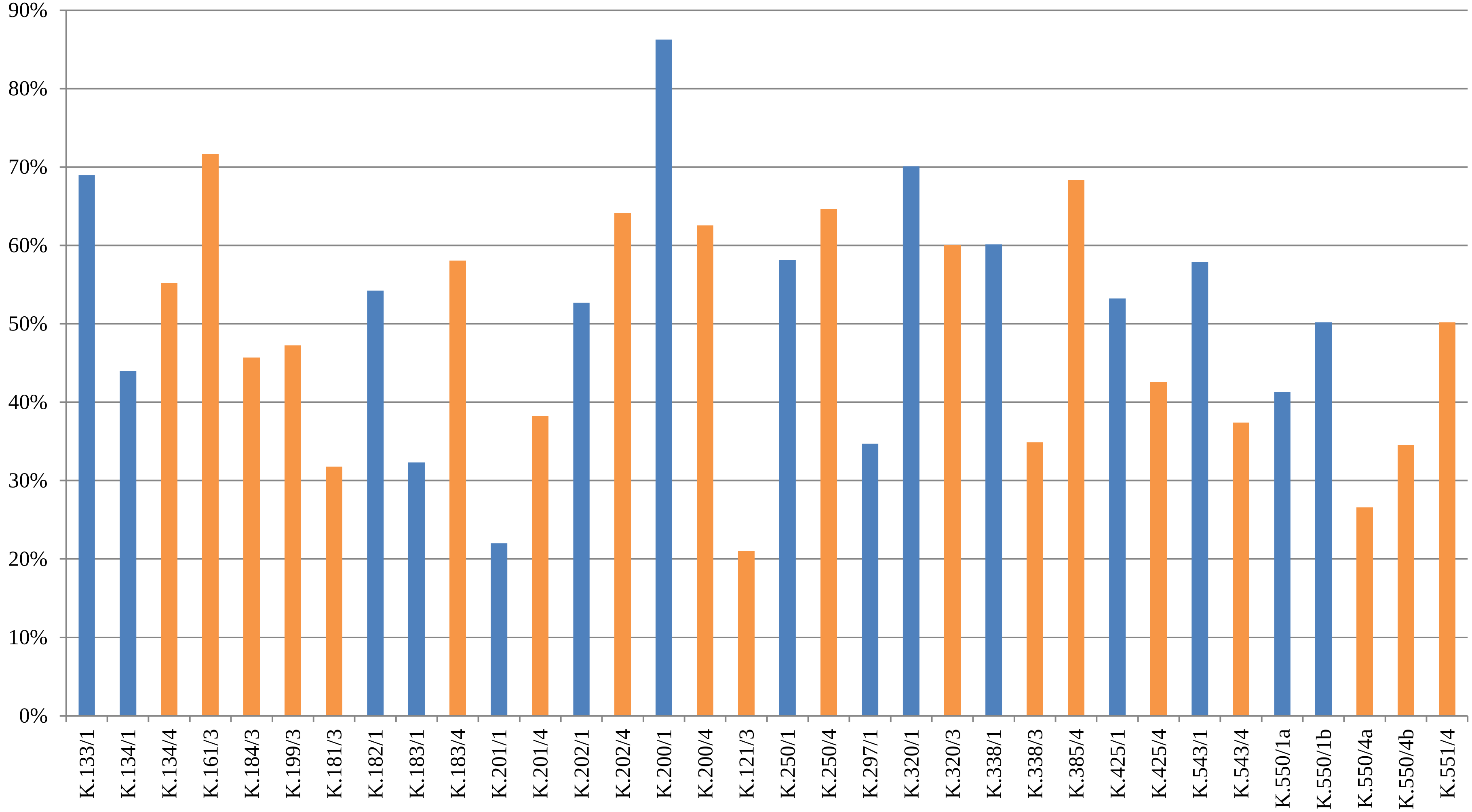
of the codas in the lower tertile, there is little change in the thematic diversity of Mozart's codas with regard to the absolute size.

Interestingly, although a smaller number of bars in length, the lower tertile of codas contains the largest proportional use of the thematic material grouped under 'other'. Given the short length of these codas, coupled with the low thematic diversity (on average, a restatement of three different types of thematic material), it can be observed that Mozart's codas, if containing thematic material from the 'other' category, consist of only one of these thematic ideas. It could also be suggested, given that the thematic diversity does not increase with the absolute size of the coda in the middle and upper tertiles, that as Mozart's codas increase in raw size, rather than increase the number of different thematic statements, they continue to consist of, on average, four thematic types, but the proportional size of these is increased.

6.4.4 Spread of Codas with regard to the Instrumentation and Orchestration Prototype

The values presented in this section represent the ranking of each instrument used, the overall percentage orchestration (the average number of instruments used per bar), and the orchestration gradient in Mozart's codas. Figure 6.9 shows the deviation from the prototype (Figure 6.5) for the instrumentation and orchestration data of Mozart's codas.

Figure 6.9 – Deviation of Mozart's codas from the instrumentation and orchestration prototype.



M/121/3 is the most conformant to the prototype, whilst M/200/1 is the least conformant. With regard to the spread of the codas from the prototype, there appears to be a greater percentage of final-movement codas conformant with the prototype. Fifty-six percent of the final-movement codas are within 50 percentage-points (mean) of the prototype, whereas only 43% of the first-movement codas are within this range. Table 6.9 shows the most- and least-conformant codas for each of the instrumentation and orchestration parameters.

Table 6.9 – Most- and least-conformant Mozart codas for individual instrumentation and orchestration parameters.

Use of:	Most-Conformant Coda(s)	Least-Conformant Coda(s)
Flute	M/543/4, M/551/4	M/134/1
Oboe	M/121/3	M/200/4
Clarinet	M/550/4b	M/385/4
Bassoon	M/297/1	M/250/4
Horn	M/201/1	M/200/1
Trumpet	M/250/1	M/133/1, M/161/3
Timpano	M/297/1	M/161/3
First Violin	M/250/4	M/200/1
Second Violin	M/543/4	M/200/1
Viola	M/184/3	M/200/1
Cello	M/297/1	M/202/4
Double Bass	M/297/1	M/202/4

Total Percentage Orchestration	M/121/3, M/202/1	M/181/3
Orchestration Gradient	M/201/1	M/202/4

Observation of the most-conformant coda suggests that Mozart's codas are heavily orchestrated, with three movements in the sample containing a *tutti* (100%) orchestration throughout the coda: M/133/1, M/134/4 and M/161/3. Observation of the most prototype-conformant coda, that from M/121/3, supports the statement regarding a heavy orchestration, with an average of 5.8 out of seven instruments sounding in each bar (83%). Furthermore, with only one exception (M/202/4), every coda in the sample concludes with an orchestral tutti (100%). Removing the three movements which contain codas with an average orchestration of 100%, and M/202/4, which does not conclude with a 100% orchestration, on average, the last 31% of a Mozart coda, regardless of the thematic material employed, comprises a *tutti* orchestration.

Interestingly, the raw data collected not only suggest a standard orchestration format for the close of the coda, but also a relationship between the thematic material employed and the percentage of orchestration throughout the coda. On average, the following thematic material contains a total orchestration percentage of:

- EFS – 78%,
- ECM – 81%,
- DM – 77%,
- CM – 91%,
- TM – 99%.

These averages suggest that passages of CM and TM are almost always orchestrated with a *tutti* orchestration. The average data for the EFS, ECM and DM could suggest either a reflection of the material's original orchestration, or the use of lighter, more diverse levels of orchestration. Combining this average data with the identified thematic ordering in Section 6.4.3 (EFS–CM–ECM–TM) (p. 278), it is possible to outline a generalised pattern for codas containing this, or a similar, thematic organisation. Beginning with EFS, the total orchestration, on average, begins at 78%, before rising 13 percentage-points to 91% in the CM. With a restatement of ECM, the total orchestration of the coda again falls to 81% before increasing once again to 99% for the final TM. This rising and falling orchestration is supported by the orchestration gradient data presented in Section 6.2.4 (p. 257), which suggest no linear change in the orchestration percentage throughout the coda.

Although not conforming directly to the model discussed in the previous paragraph, M/338/3, which is the most-conformant coda for use of thematic material and the orchestration of the coda combined (1st and 8th, respectively), provides an example of this rising and falling orchestration. Commencing with eight bars of EFS, the average total orchestration for this passage is 71%. This is followed by four bars of DM, where the average total orchestration rises to 90%. With four bars of CM, the average total orchestration falls to 63%, before rising again, to 100%, for the final eight bars of ECM and four bars of TM.

M/320/3 and M/338/1, which match the thematic ordering identified in Section 6.4.3 (p. 278), also support the identified rising and falling Mozart orchestration. There are only three differences between them and the averages. The orchestration value for the EFS in M/320/3 and M/338/1, and the orchestration value for the ECM in M/338/1, are larger than the averages (16, 8 and 9 percentage-points, respectively).

Although this rising and falling orchestration can be found in larger codas, in smaller codas, or in codas which contain fewer thematic restatements, the coda may just contain an increasing orchestration throughout. M/200/1 is identified as the least-conformant coda from the prototype, both overall and for the proportional use of the horn, first and second violin and viola. In this example, the coda only contains two thematic statements (EFS and CM). The first six bars of EFS (bb. 160–165) in the coda have a total average orchestration of 46%. This increases to 91% in the final eight bars for the CM (bb. 166–173). The last four bars (bb. 110–173) of the coda consist of orchestral *tutti*. These four bars constitute 29% of the movement, only two percentage-points lower than the *tutti* average (31%).

Instrumentation/Orchestration and Raw Coda Length

As with the harmonic and thematic data, relationships exist between the instrumentation and orchestration of the coda and the raw length. Table 6.10 shows the average instrumentation and orchestration data for the three tertiles of codas organised with regard to the raw length of the coda.

Table 6.10 – Tertile ranges showing the difference in coda instrumentation and orchestration according to coda length.

	Raw Average Length (bars)	Lower Tertile	Middle Tertile	Upper Tertile
		1–18	19–24	25–68
	Total Percentage Orchestration (%)	90	80	77
	Orchestration Gradient	0.01	0.02	0.01
Proportion (%)	Flute	83	83	65
	Oboe	79	73	75
	Clarinet	94	84	65
	Bassoon	98	86	81
	Horn	80	67	72
	Trumpet	70	57	60
	Timpano	86	60	55
	First Violin	100	94	97
	Second Violin	100	92	98
	Viola	99	81	92
	Cello	92	82	83
	Double Bass	93	82	81

Coupled with the total orchestration data, it would appear that codas in the lower tertile are more likely to contain a statistically unchanging orchestral *tutti*. However, as the size of the coda increases, so does the diversity of orchestration. With the exception of the oboe, where the smallest proportion of its use is located in the middle tertile, the proportion of woodwind and timpani used reduces as the coda section becomes larger. The proportional use of brass and strings, with the exception of the double bass, is at its lowest in the middle tertile.

6.5 The Meta-Prototypical Mozart Coda

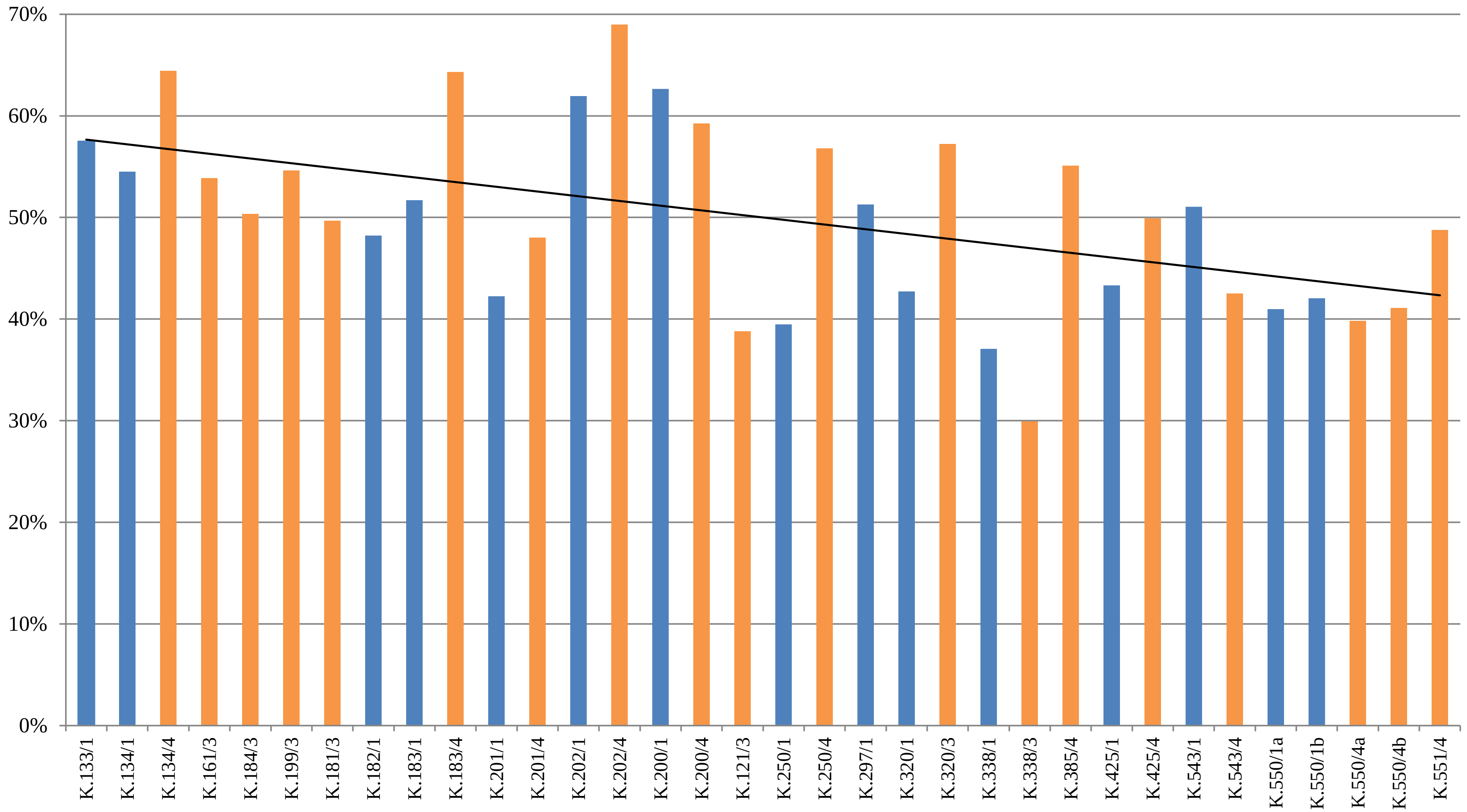
Having established the most- and least-conformant codas for the four parameters investigated in isolation, the final stage of the prototype investigation for the coda in Mozart's symphonies is to combine the data for the four parameters and to calculate the meta-prototypical coda. Table 6.11 summarises these for the four parameters investigated.

Table 6.11 – Most- and least-conformant Mozart codas with regard to the four parameters investigated.

Parameter	Most-Conformant Coda	Least-Conformant Coda
Structure	M/338/3	M/297/1
Harmony	M/338/1	M/202/4
Thematic Material	M/338/3	M/550/4
Instrumentation/Orchestration	M/121/3	M/200/1

So that the parameters receive equal weighting when the combined parameter prototype is calculated, the sum of the rank data is divided by the total number of individual parameters studied. For example, the sum of the rank data for structure is divided by two, because it is the sum of two individual parameters (raw coda length and proportional coda length). Figure 6.10 shows the percentage-point deviation from the combined parameter prototype for Mozart's codas.

Figure 6.10 – Deviation of Mozart's codas from the combined parameter prototype.



From observation of the line of best fit applied to Figure 6.10, it appears that Mozart's codas *become more conformant with the prototype* over time. A test for correlation between the final percentage-point deviation from the prototype and time supports this observation. The results of the SRCT identify a 99.5% significant moderate negative correlation (-0.47). As with Haydn, this could constitute evidence that Mozart experimented more regularly with the organisation of the coda in his early symphonies, before adopting a more consistent formula in the latter half of the 1770s and 1780s. However, given the organisation of Mozart's earlier codas, for example M/161/3 – which contains only CM and TM, primarily uses tonic chords, and has a total orchestration average of 100% – Mozart's earlier codas are in fact simpler than the prototype. It is likely that this simplicity is what makes Mozart‘s earlier codas less conformant than his later ones. M/183/4, which contains the second least-conformant coda, is only eight bars long, proportional to 2% of the movement, contains no statement of EFS or ECM and has a total percentage orchestration of 89%.

The percentage of movements fewer than 50 percentage-points (mean) from the prototype is higher in Mozart's first movements. Sixty-four percent of Mozart's first movements are within 50 percentage-points of the prototype, in comparison with 50% of the final movements. Two out of the three most conformant (M/338/3 and M/121/3) and the three least-conformant coda s (M/202/4, M/183/4 and M/134/4) can all be found in the final movements of Mozart's symphonies. Not only do the final-movement codas provide a good template for a prototypical coda, but they also contain Mozart's least-conformant codas.

6.5.1 The Most-Conformant Coda

M/338/3 is the most prototypical coda in the sample of symphonies. This coda ranks as the closest to the prototype for the structural proportions of the coda and use of thematic material, and the eighth most prototypical for the orchestration and instrumentation data. The only parameter for which M/338/3 is not a close prototypical example is for the harmonic data. For the harmonic parameter this coda ranks 14th, 32 percentage-points from the single-parameter prototype. This figure is explained by the lower proportion of tonic chords (16 percentage-points), a slightly increased proportion of supertonic chords (four percentage-points), a significantly increased proportion of diminished-seventh chords (11 percentage-points), an additional two chords in chord diversity, and a harmonic gradient ranked 22nd from the prototype.

6.5.2 The Least-Conformant Coda

In comparison with M/338/3, M/202/4 contains the least-conformant coda. Constructed of only fourteen bars, proportional to 3% of the whole movement, this coda is ranked as the 5th least-conformant coda with regard to structural proportion data. Harmonically, this movement is the least conformant, comprising 71% tonic chords, 14% subdominant chords, 14% dominant chords, a low chord diversity and a harmonic gradient ranked 31st from the prototype. In addition, instead of a negative harmonic gradient, M/202/4 contains a positive gradient. This harmonic gradient reflects a coda which begins with six bars of tonic chord (bb. 206–211) before becoming more harmonically active towards the end of the coda (bb. 212–219). With regard to the thematic material, the coda ranks 26th from the prototype, containing only five bars of EFS and nine bars of material based on bb. 84–90 from the development. Finally, this coda also ranks 28th from the prototype with regard to the instrumentation and orchestration parameter. With the exception of one minor increase (the addition of the oboe at b. 215), the total percentage orchestration decreases through the coda. In addition, as discussed in Section 6.4.4 (p. 285), M/202/4 is the only coda which does not conclude with a full orchestral *tutti*.

6.6 Changing Trends in Mozart's Coda

With the prototype established, and the most- and least-conformant codas identified with regard to this data, the following section, through the use of the SRCT, will highlight individual parameters which undergo change over time.

6.6.1 Structural Correlations

With regard to the changes in the structural parameters of Mozart's symphonies over time, the results of the SRCT indicate a 99% significant moderate positive correlation (0.44) between the raw length of the coda and time. This result confirms a commonly accepted generalisation that *Mozart's codas increase in size over time*. However, as with Haydn's coda, while Mozart's codas do increase in raw size over time, the proportional relationship between the coda and the rest of the movement, on average, remains the same. The SRCT for proportional size against time does not suggest a significant correlation (-0.12). A selection of codas taken from the beginning, middle and end of Mozart's compositional output provides examples of these two correlations.

The coda from M/161/3 measures 15 bars, which is proportional to 9% of the movement. The coda from M/250/1, written approximately three years later is also proportional to around 9% of the movement. However, the raw length of the coda has increased by 11 bars. Finally, M/551/4, dated a further *c.*12 years after M/250/1, contains a coda 68 bars in length, but once again it is proportional to 9% of the whole movement. Given this diversity in the correlation data, it would appear that the proportional data is the set best used to describe the prototype. Mozart, like Haydn, increases the raw size of the coda over time. However, on average, he maintains the same proportional size of the coda, regardless of the raw size of the movement.

6.6.2 Harmonic Correlations

Given the large number of individual parameters investigated under the heading of harmony (use of tonic chords, use of dominant chords, chord diversity, harmonic gradient, etc.), there are only three which undergo significant statistical change across Mozart's symphonies. A 99.9% significant moderate-strong positive correlation (0.64) is identifiable for the chord diversity of the coda against time, which suggests that the codas become harmonically more diverse over time. In addition, a 97.5% significant weak-moderate positive correlation (0.36) is identifiable for the harmonic rhythm of Mozart's codas. This suggests that Mozart's later codas become more harmonically active, with a faster harmonic rhythm. However, a further 99.5% significant moderate negative correlation (-0.52) exists between the use of tonic chords and time. This suggests that, although a wider diversity of chords and a faster harmonic rhythm may be present in Mozart's later symphonies, the proportion of tonic chords in Mozart's symphonies declines over time.

6.6.3 Thematic Correlations

As with the harmonic correlations, only three significant correlations are identifiable between the thematic sub-parameters (i.e., use of thematic material and thematic diversity) and time. First, a 99.5% significant moderate positive correlation (0.47) is identifiable for the proportional use of ECM in the coda against time. This increase may be partly explained by the increased number of elided codas found in Mozart's later symphonies (see Section 4.3.3, p. 197). Secondly, a 95% significant weak-moderate negative correlation (-0.30) is identifiable for the proportional use of TM in Mozart's codas. This data suggests that the proportion of ECM in the coda increases over time, whilst the proportion of TM decreases. Interestingly, a test for correlation between the proportional use of ECM and TM identifies a further relationship. A 95% significant weak-moderate negative correlation (0.32) is identifiable for the proportional use of ECM and TM. This suggests a link between these two types of material, supporting the first two correlations, in that as the proportion of ECM increases, the proportion of TM decreases. However, this is not a mutually exclusive correlation (i.e., whenever there is a reduction in the proportional use of TM in a Mozart coda there is not invariably an increase in the proportional use of ECM), and similar correlation results exist between the proportional use of other thematic material, for example, ECM and EFS (-0.44), and TM and DM (-0.33). The third correlation, a 95% significant weak-moderate positive correlation (0.34), is identifiable between the diversity of thematic material used in the coda and time. This suggests that a greater variety of thematic material is used in Mozart's later codas.

6.6.4 Orchestration and Instrumentation Correlations

Although correlations exist for certain instruments over time regardless of their presence in a given movement (e.g., there is a 99.5% significant moderate positive correlation (0.46) for the use of timpani when compared against time), these figures are not necessarily representative of the changes in coda orchestration. The figures are more likely to be reflective of instrument development, player availability and choice of tonic key. In the case of the timpano, the instrument is only present in 14 of the 32 movements in the Mozart sample. This is not necessarily a compositional decision by Mozart, but it will significantly alter the statistical results.

In order to achieve a true reflection of any changes in coda orchestration, only the relationship between the instrument and the works these instruments are present in is calculated (i.e., for the timpano, the comparison sample is reduced from 32 to 14). Given the lack of codas which contain clarinet, it is not possible to apply the SRCT to this sample and so it is not possible to identify any correlations regarding the use of this instrument in the codas. The results of the correlation testing suggest no significant changes in the use of individual instruments, or in the total percentage orchestration, over time.

6.7 Summary

By using the data collected using the methodology in Chapter Two, Chapter Six has explored the structure and function of the coda in Mozart's first and final symphonic movements. Section 6.2 (p. 253) established a prototype for each of the four compositional parameters explored, identifying that:

- Mozart's codas average 28 bars in length, constituting, on average, 9% of the whole movement.
- Mozart's codas, on average, are constructed of six chord types, consisting of 57% tonic harmony, 19% dominant harmony and 7% supertonic harmony. The remaining 17% are constructed of subdominant, submediant, diminished-seventh and secondary-dominant harmonies.
- Thematically, on average, Mozart's coda consist of 31% EFS, 21% ECM, 10% DM, 14% CM, and 16% TM. Seventy-five percent of the codas in the Mozart sample contain EFS, 28% contain DM, 50% contain ECM, 78% contain CM and 59% contain TM.
- The total orchestration of Mozart's codas averages 81%, with very little significant change in the orchestration throughout their duration.

As Section 6.3 (p. 258) has shown, there are a number of small variations in the use of EFS, DM, ECM and TM between the first- and final-movement codas. In comparison with final-movement codas, first-movement codas contain, on average, a larger proportion of EFS and ECM, but a smaller proportion of DM and TM. In addition to a few variations in the use of thematic material in the first- and final-movement codas, there are also some differences in the orchestration and instrumentation. There is a significantly larger proportion of clarinet, bassoon and trumpet in Mozart's first-movement codas than the final movements. Furthermore, although not statistically verifiable, in comparison with the final movement, there appears to be an increased proportion of woodwind present in Mozart's first-movement codas, whilst there is an increased proportion of strings in Mozart's final-movement codas.

With the prototype established in Section 6.2, the most- and least-conformant codas for each of the individual parameters have been identified. Shown in Table 6.11, the methodology employed identified the codas in M/338/3, M/338/1, M/338/3 and M/121/3 as the most conformant for structure, harmony, thematic material and instrumentation and orchestration, respectively; identifying the codas from M/297/1, M/202/4, M/550/4 and M/200/1 as the least conformant, respectively. With regard to the spread of first and final movements from the prototypes, Section 6.4 (p. 267) identified that:

- A greater proportion of the first-movement codas is closer to the structural prototype than the final-movement codas.
- A greater proportion of the first-movement codas is closer to the harmonic prototype than the final-movement codas.
- A greater proportion of the first-movement codas is closer to the thematic material prototype than the final-movement codas.
- A greater proportion of the final-movement codas is closer to the orchestration and instrumentation prototype than the first-movement codas.

As the examples in this chapter have identified, it appears that a number of underlying standard procedures exist in Mozart's codas. Section 6.4 identified that:

- A longer coda is often balanced by a smaller exposition and/or recapitulation. The coda appears to adopt, in part, the role of the recapitulation, restating the key EFS material and then creating closure through the use of emphatic chords and cadences.
- 38% of the sample contains a harmonic rhythm which increases in the passages of ECM, CM and TM, with passages of CM being the most harmonically active.

- In nine percent of the sample, the harmonic rhythm is highest in the EFS, ESS and/or DM.
- Nine percent of the sample is harmonically active throughout.
- In the remaining 44%, the harmonic rhythm varies across the different thematic cells.
- The shorter the absolute length of the coda:
    - the larger the proportion of tonic chords,
    - the smaller the proportion of dominant chords,
    - the smaller the chord diversity,
    - the steeper the harmonic gradient.
- Those codas with a raw length between 19 and 24 bars contain the fastest average harmonic rhythm.
- Although not as standardised as the progression of thematic material in the exposition, an underlying format for coda thematic organisation does appear to exist in the coda, namely EFS–CM–ECM–TM.
- As Mozart's codas become longer:
    - the proportion of EFS and ECM increases,
    - the proportion of CM and TM decreases,
    - the use of ETM, ESS and DM decreases.
- The thematic diversity of codas over 19 bars in length remains the same, whilst codas under 19 bars in length contain less thematic diversity.
- Mozart's codas are generally heavily orchestrated. Passages of CM and TM contain the highest total average orchestrations.
- Mozart's longer codas contain a rising and falling orchestration throughout the coda, whilst Mozart's shorter codas tend to contain a generally increasing orchestration.

As discussed in Section 6.5 (p. 291), by aggregating the data for all the parameters (Table 6.11), it is possible to identify the meta-prototypical coda for Mozart's symphonic first- and final-sonata-allegro and sonata-rondo movements. In addition to identifying M/338/3 as the most-conformant coda and M/202/4 as the least-conformant coda, Section 6.5 identified that:

- Mozart's codas *become more conformant with the prototype* over time. Although this may suggest that Mozart experimented (more consistently) with the organisation of the coda in his early symphonies before adopting a more constant formula, observation of Mozart's earlier codas actually suggests that the early codas are non-conformant because of their brevity.
- The percentage of movements less than 50 percentage-points from the prototype is higher in Mozart's first movements than his final movements.
- The three most-conformant codas (M/338/3, M/338/1 and M/121/3) can be found in one first and two final movements, whilst the three least-conformant codas (M/202/4, M/134/4 and M/183/4) occur in the final movements. Not only do the final-movement codas provide a good template for a prototypical coda, they also, paradoxically, contain Mozart's least conformant examples of the coda.

Although the correlation data presented in Section 6.6 (p. 295) suggest that, over time, the coda becomes larger (raw length), chord diversity and harmonic rhythm increase, the use of tonic chords decreases, the use ECM increases, the use of TM decreases, and thematic diversity increases, the general lack of significant strong correlations suggests that Mozart's codas, with regard to the parameters investigated, do not statistically change over time.

With the prototype established for the coda in the first and final movements of Mozart's symphonies, Chapter Seven will explore the coda in the sample of movements by Beethoven.

Chapter Seven – The Coda in Beethoven's First and Final Symphonic Movements

7.1 Introduction

As outlined in Chapters Five and Six, this chapter will establish the numerical prototypical data for the coda in the first and final movements of Beethoven's symphonies. The prototypical data presented in this chapter is again a reduction of that collected for Beethoven's codas and represents the structural proportions, harmony and thematic organisation, and the use of instrumentation and orchestration. This chapter identifies the most- and least-conformant Beethoven coda for each of the parameters, whilst also identifying the most- and least-conformant coda representative of the whole Beethoven sample. Although there did not appear to be many significant differences between the organisation of the coda in Haydn's first and final movements (Section 5.3, p. 211), and similarly Mozart's first and final movements (Section 6.3, p. 258), this chapter will cross-compare the mean data for the coda in Beethoven's first and final movements to ascertain if this conclusion also applies to Beethoven's coda. Section 7.5 will highlight any compositional parameters which undergo change over time. This chapter follows the same structural layout as Chapters Five and Six. By using these chapters as a template, the reader is able to cross-compare the data and observations made in here with the data and observations made in the preceding two chapters. Section 7.2 outlines the prototype data for the four investigated parameters of Beethoven's codas.

7.2 Prototype Beethoven Coda Data

7.2.1 Prototype Structural Proportions Data

On average, the starting bar of Beethoven's codas is identifiable by three criteria, with generally four applicable criteria (i.e., four criteria identify a candidate starting bar, but only three converge on the same bar). Beethoven's coda sections average 103 bars in length, constituting, on average, 20% of the whole movement.[37] Given that to identify the source of the thematic material in the coda, it was again necessary to analyse the exposition and development section, it is possible to provide an average proportional length for the introduction, exposition, development, recapitulation and coda. The exposition is the largest section, proportionally 38%, on average, of the whole movement. Interestingly, the remaining two sections (development and recapitulation) are almost, on average, equal in size (separately) to the coda. The development, on average, is the smallest section, proportional to 19% of the movement (one percentage-point smaller than the coda). The recapitulation is, on average, proportional to 21% of the movement (one percentage-point larger than the coda).

In five of the relevant 16 movements an introduction is added. This section, on average, constitutes approximately 6% of the movement. Furthermore, in movements which contain an introduction, the exposition is, on average, significantly larger (ten percentage-points) and the coda significantly smaller (13 percentage-points). The development and recapitulation remain almost the same (one and two percentage-points, respectively). Figures 7.1 and 7.2 show the structural proportions in the prototype sonata-form first and final movement by Beethoven. Figure 7.1 shows the average proportions for a movement containing an introduction, whilst Figure 7.2 shows the average proportions for a movement which does not contain an introduction.[38]

[37] If B/8/4 is removed from the sample, given its anomalous size, the average coda length is 95 bars, proportional to 19% of the movement.
[38] The differences between the proportions of a first and final movement are explored in Section 7.3.1.

Figure 7.1 – Prototype structural proportions for the symphonic sonata-form first and final movements with introduction by Beethoven.

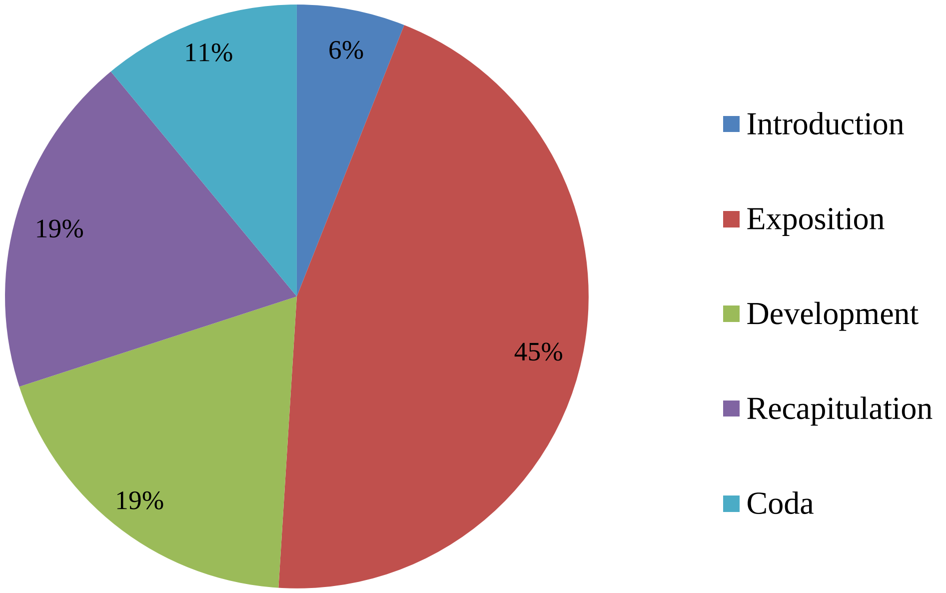
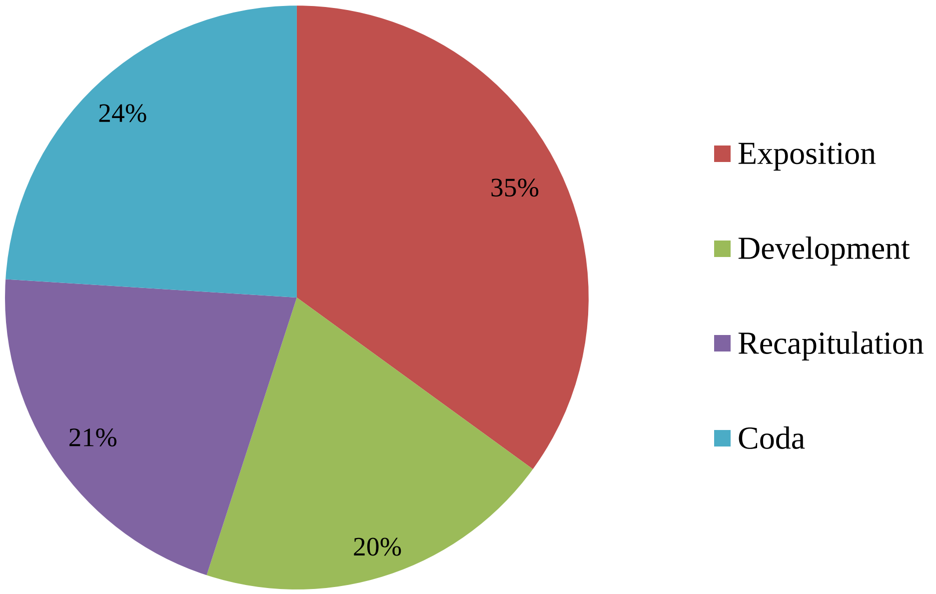


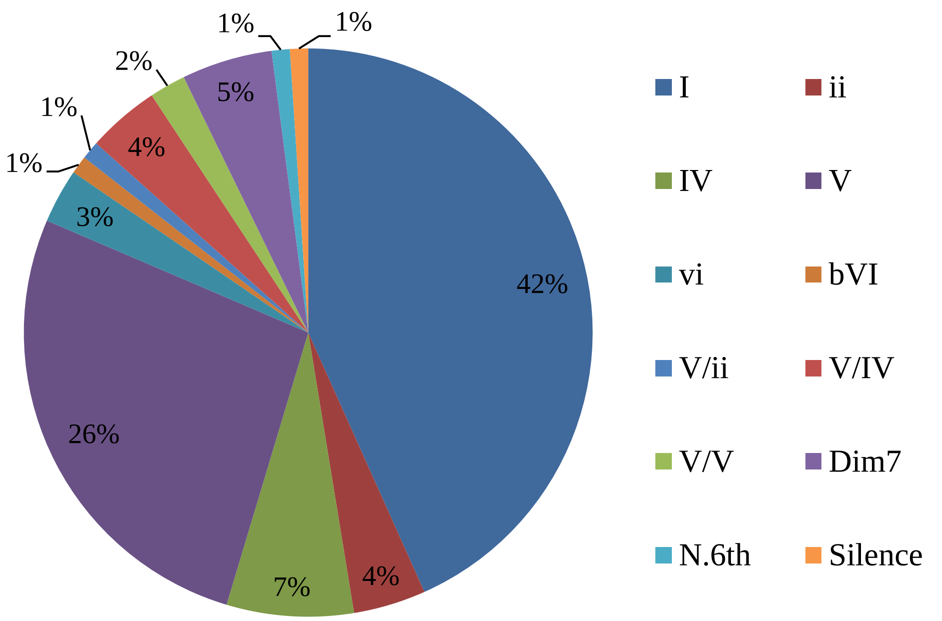
Figure 7.2 – Prototype structural proportions for the symphonic sonata-form first and final movements without introduction by Beethoven.



7.2.2 Prototype Harmonic Data

Beethoven's codas contain, on average, a proportion of tonic chords equivalent to 42% of the coda. This is the most common type of chord found in the coda, with the dominant chord being the second most common (26%), and the subdominant the third (7%). On average, the remaining 25% of the coda is constructed of supertonic, submediant, diminished-seventh and secondary-dominant harmonies. The average proportion of tonic harmony in Beethoven's codas is the smallest in comparison with Haydn and Mozart, whilst the proportion of dominant harmony is equal with Haydn. The harmonic rhythm of Beethoven's coda averages 0.76 chords per bar, 0.59 chords per bar slower than in Mozart's codas and almost half Haydn's harmonic rhythm. Figure 7.3 shows the harmonic proportions in the prototype symphonic sonata-form first- and final-movement coda by Beethoven.

Figure 7.3 – Prototype chord proportions for the symphonic sonata-form first- and final-movement codas by Beethoven.

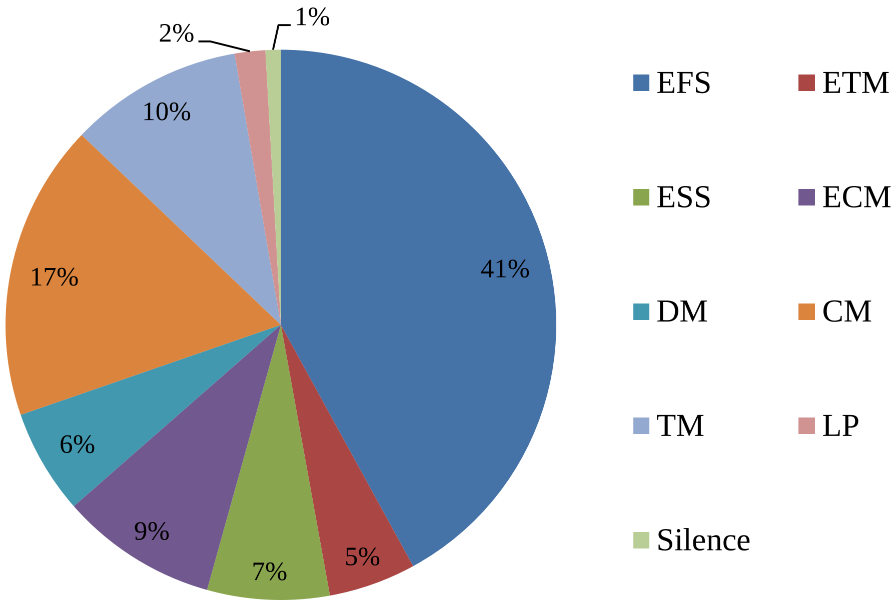


7.2.3 Prototype Thematic Data

Thematically, the prototype suggests that Beethoven's codas contain the largest proportion of EFS, ETM and ESS across all three composer samples.[39] Combined, these passages make up, on average, 56% of Beethoven's codas. The remainder of the coda comprises primarily ECM, CM and TM. On average, 10% of the coda is constructed from material retraced from the ECM, 15% is constructed of CM and a further 10% is constructed of TM. The percentage of ECM and TM are the smallest of all three composer samples. Interestingly, the percentage of TM is only one percentage-point smaller than the average proportion of TM in Haydn's codas, and the percentage of CM is only one percentage-point larger than the average proportion of CM in Mozart's codas. Figure 7.4 shows the prototype thematic proportions in the sample. To simplify the presentation of data, coda material which is based on an expansion or variation of material from earlier in the movement is grouped together with coda material which repeats almost directly material from earlier in the movement (e.g., material from the ECM and material expanded from the ECM).

[39] As explained in Section 2.4.3 (p. 76), EFS = Expositional First Subject, ETM = Expositional Transition Material, ESS = Expositional Second Subject, ECM = Expositional Closing Material, DM = Development Material, CM = Cadential Material, TM = Tonic Material, LP = Link Passage.

Figure 7.4 – Prototype thematic organisation of the symphonic sonata-form first or final movement coda by Beethoven.

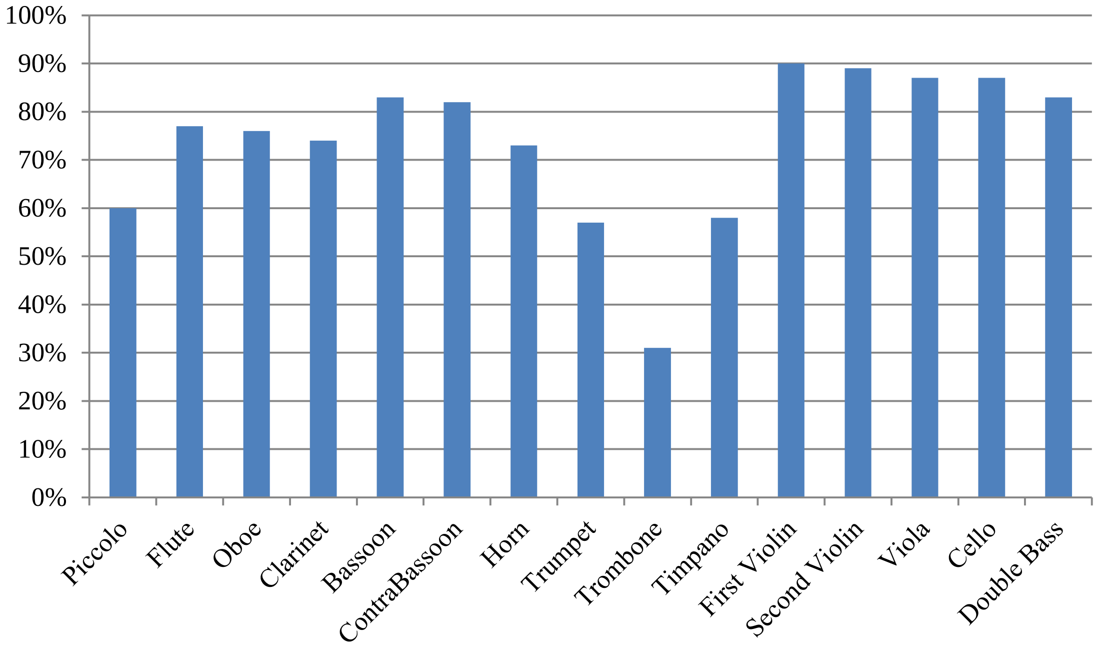


Although not occurring in all codas, where there is repetition of material within the coda (e.g., repetition of cadential gestures), this, on average, constitutes 6% of the coda. This figure is the same as that found in Haydn's codas. As highlighted in Section 5.2.3 (p. 208) and Section 6.2.3 (p. 256), both Haydn and Mozart include IM in their coda sections. In Beethoven's codas this use of IM can only be found in B/1/4 (bb. 238–242).

7.2.4 Prototype Instrumentation and Orchestration Data

The prototype for the total orchestration averages 78% (i.e., on average 78% of the instruments are sounding at any one time in the coda), with very little change as the coda progresses in the number of instruments deployed. This is reflected in the orchestration gradient, which measures 0.004, a shallower gradient than that in Haydn's and Mozart's codas. The instrumentation of the coda is naturally determined by the movement to which it is attached. The most common instrumentation (mode average) for Beethoven's codas is two flutes, two oboes, two clarinets, two bassoons, two horns, two trumpets, two timpani, first and second violins, violas, cellos and double basses. Although not present in the mode average instrumentation, B/5/4 incorporates a piccolo, contrabassoon and three trombones, and B/6/5 incorporates two trombones. Figure 7.5 shows the average instrumentation proportions in the sample.

Figure 7.5 – Prototype use of instrumentation in symphonic sonata-form first- and final-movement codas by Beethoven.



7.3 Comparison of the First and Final Movement Prototype Codas

In Chapter Four the question ‘Do composers construct the coda differently depending on the movement to which it is attached?’ was asked. With the average data collected for all Beethoven codas, the sample can be divided into first- and final-movement codas and the data compared to determine whether or not any significant differences are present. A difference between the first and final movement is regarded as significant if the prototype data for either movement diverges more than five percentage-points from the combined prototype data. If numerous significant differences are present between the two movement samples, then it will be necessary to explore and identify the prototypical coda with regard to the first and final movements separately.

7.3.1 Structural Proportions

Based on the data collected for the size of Beethoven's codas, the structural proportions of movements which contain a coda, and the number of criteria used to identify the coda, a number of comparisons can be identified. Table 7.1 provides a comparison of the average proportional data for the coda in the first and final movements of Beethoven's symphonies, to be read in conjunction with the combined movement prototype shown in Figures 7.1 and 7.2.

Table 7.1 – Comparison of the prototype structural data for the codas in Beethoven's first and final movements.

	Proportional Size of Movements (%)		
	First Movement Prototype with Introduction	First Movement Prototype without Introduction	Final Movement Prototype
Introduction	3	n/a	n/a
Exposition	41	38	34
Development	21	23	17
Recapitulation	20	21	21
Coda	14	18	28

	Number of Criteria	
Criteria applicable to the identification of the coda	4	4
Criteria eligible for the identification of the coda	3	3

As can be seen from Table 7.1, there are a number of differences between Beethoven's first movements which contain a coda and the final movements which contain a coda. Although the recapitulation broadly maintains its proportional size, both the exposition and development are proportionally larger in the first movements than in the final movements, whilst the coda is proportionally larger in the final movements. From these data, it would appear that in Beethoven's final movements a proportionally larger coda section is primarily balanced by a proportionally smaller exposition section. Further testing, using SRCT (Section 2.6, p. 87), supports this observation, identifying a 99.5% significant strong negative correlation (0.99) between the final movement exposition and coda. This indicates that as the proportional size of the coda increases, the proportional size of the exposition decreases. However, no significant correlation was found between the length of the development and that of the coda, suggesting that a proportionally larger coda is not always balanced by a proportionally smaller development.

The longest raw-length and proportional coda in the sample is found in B/8/4 (236 bars in length and proportional to 47% of the movement). However, this final-movement coda appears to be a structural anomaly, being 85 bars longer than B/5/4, the second longest raw-length coda. Furthermore, the second and third proportionally longest codas, found in B/2/4 and B/6/5, are, in terms of proportions, 13 and 14 percentage-points smaller, respectively, than the coda of B/8/4.

Unlike the data for Haydn's and Mozart's codas, the average number of criteria applicable for the identification of the start of the coda in Beethoven's first and final movements is the same, whilst also matching the prototype data (Section 7.2.1, p. 303). This suggests that regardless of the size of the coda, its start, on average, is clearly identified by at least three of the eight criteria (Section 3.1, p. 90).

In comparison with the prototype data for the coda in Haydn's and Mozart's first and final movements, it is worth noting that there are significant differences between the movement averages, with the largest difference between the proportional lengths of the coda. Given this difference, it will be necessary to explore and identify the prototypical coda with regard to the first and final movements separately (Table 7.1) rather than the combined prototypes (Figures 7.1 and 7.2).

7.3.2 Harmonic Data

With the exception of the proportion of tonic harmony present in Beethoven's final-movement codas, the harmonic data collected shows no significant differences between the harmonic proportions of the coda in Beethoven's first and final movements (i.e., the differences are less than five percentage-points from the combined prototype data). Table 7.2 provides a comparison of the average harmonic data for the coda in the first and final movements of Beethoven's symphonies, to be read in conjunction with the combined movement prototype shown in Figure 7.3.

Table 7.2 – Comparison of the prototype harmonic data for the codas in Beethoven's first and final movements.

		Combined Movement Prototype	First Movement Prototype	Final Movement Prototype
Proportion (%)	I	42	44	37
	ii	4	4	5
	IV	7	6	7
	V	26	23	29
	vi	3	3	4
	bVI	1	1	n/a
	V/ii	1	1	1
	V/IV	4	3	4
	V/V	2	1	3
	Dim7	5	7	2
	N.6th	1	1	n/a
	Silence	1	1	1

Chord Diversity	9	9	9
Harmonic Rhythm (per bar)	0.76	0.72	0.81

Chord Proportions

As the data show, there is very little difference between Beethoven's first and final movements in the proportions of chords. The largest percentage-point difference between the movements can be found between the proportions of tonic chords (7%). This is followed by a six percentage-point difference between the proportions of dominant chords. From observation of the prototype data for the first and final movements, it might be thought that the reduction of tonic harmony in Beethoven's final-movement codas is balanced by an increased percentage of dominant harmony. However, a SRCT between these data sets identifies no significant correlations to support this. The percentage-point difference between the chord-use data is not substantial. Although there are exceptions, on average the codas of the first and final movements are almost equal with regard to chord use on these measures.

Harmonic Rhythm and Chord Diversity

There is very little difference between Beethoven's first- and final-movement codas in harmonic rhythm and no difference in the average chord diversity. Based on the two movement prototypes, it is concluded that the codas in Beethoven's final movements have a faster harmonic rhythm than those of the first movements. However, the difference between these two values is too small (0.09) to warrant regarding this as a significant difference.

7.3.3 Thematic Material Data

The prototype data for the use of thematic material in Beethoven's codas do show some variation between the first and final movements. The most noteworthy differences can be found in the use of ETM, ESS, ECM and CM. However, as with the harmonic data, with one exception, ETM, the differences between the two movements are not large enough to be regarded as significant (i.e., the differences are less than five percentage-points from the combined prototype data). Table 7.3 provides a comparison of the prototype thematic material data for the coda in the first and final movements of Beethoven's symphonies, to be read in conjunction with the combined movement prototype shown in Figure 7.4.

Table 7.3 – Comparison of the prototype thematic material data for the codas in Beethoven's first and final movements.

		Combined Movement Prototype	First Movement Prototype	Final Movement Prototype
Proportion (%)	IM (where applicable)	n/a	n/a	1
	EFS	41	42	40
	ETM	5	n/a	12
	ESS	7	10	4
	ECM	9	12	6
	DM	6	6	7
	CM	17	15	20
	TM	10	11	9
	LP	2	3	n/a
	Silence	1	1	1
	Thematic Diversity	5	4	5

As can be seen from Table 7.3, there appears to be, on average, an almost equal amount of EFS (42:40%), DM (6:7%) and TM (11:9%) used in the coda in Beethoven's first and final movements. However, with regard to material taken from other sections of the exposition, it appears that Beethoven's first- and final-movement codas are slightly more diverse. There is a six percentage-point difference in the use of ESS, a four percentage-point difference in the use of ECM, and a five percentage-point difference in the use of CM. It is the difference in the use of ETM which is the most significant, however. In comparison with the first movement, on average, 12 percentage-points more of the final-movement coda is made up of ETM. Furthermore, ETM is only present in Beethoven's final-movement codas (i.e., B/2/4, B/5/4, B/6/5 and B/7/4).

7.3.4 Instrumentation and Orchestration Data

In general, the instrumentation and orchestration of Beethoven's first- and final-movement codas appear to be fairly consistent, with only a few identifiable differences. Table 7.4 provides a comparison of the average instrumentation and orchestration data for Beethoven's codas, to be read in conjunction with the combined movement prototype shown in Figure 7.5.

Table 7.4 – Comparison of the prototype instrumentation and orchestration data for the codas in Beethoven's first and final movements.

		Combined Movement Prototype	First Movement Prototype	Final Movement Prototype
Proportion (%)	Piccolo	60	n/a	60
	Flute	77	77	77
	Oboe	76	79	73
	Clarinet	74	80	68
	Bassoon	83	84	81
	Contrabassoon	82	n/a	82
	Horn	73	76	69
	Trumpet	57	63	51
	Trombone	31	n/a	31
	Timpano	58	63	50
	First Violin	90	90	89
	Second Violin	89	90	87
	Viola	87	87	86
	Cello	87	86	89
	Double Bass	83	84	80

Total Percentage Orchestration (%)	78	80	74
Orchestration Gradient	0.004	0.004	0.004

As can be seen from Table 7.4, there is a significant 12 percentage-point difference between Beethoven's first and final movements in the use of the clarinet, a 12 percentage-point difference in the use of the trumpet and a 13 percentage-point difference in the use of timpani. Based on the prototypes, and with the exception of the flute and the cello, there appears to be, on average, a larger proportion of all instruments in Beethoven's first- rather than final-movement codas. This could suggest that the latter are more diverse with regard to the orchestration, whilst the first-movement codas favour thicker or *tutti* orchestration. This suggestion is supported by the total percentage orchestration data, which show that, on average, the orchestration of Beethoven's first-movement codas are six percentage-points more fully orchestrated than the final-movement codas.

In contrast with Haydn, but similar to Mozart, Table 7.4 shows that in comparison with the final-movement codas, there is an increased proportion of trumpet use in Beethoven's first-movement codas. However, unlike Haydn and Mozart, there is no statistical correlation between Beethoven's deployment of the trumpet and the use of TM and tonic harmony. Further application of the SRCT to all the structural, harmonic and thematic parameters only identifies one significant correlation with the use of the trumpet. A 95% significant moderate negative correlation (-0.46) exists between the use of the trumpet and the presence of DM in the coda. This correlation could suggest that the trumpet is not as active in the coda when DM is present. Examples of this correlation can be found in B/3/1 and B/4/1. B/4/1 contains the largest proportional deployment of trumpet in the coda. However, and perhaps unsurprisingly, this movement contains no DM. B/3/1 contains the largest proportion of DM, but contains the second smallest proportional deployment of trumpet.

Interestingly, the significant negative correlation between the proportional deployment of the trumpet and the use of DM can also be found in the proportional deployment of the timpani. A test for correlation between these two data sets reveals a 99% significant strong-moderate negative correlation (-0.64). This suggests, similar to the trumpet, that if there is an increased proportion of DM in the coda, there is a reduced presence of the timpani.

Finally, like the deployment of the clarinet in Mozart's codas, there is a significant difference between Beethoven's first- and final-movement codas in the use of the clarinet. However, no statistically supported theories can be suggested regarding this difference. At this stage, it can only be concluded that these differences in clarinet deployment are potentially a product of the operation of compositional choices that are not formalised in the current model.

7.4 Parameter Prototypical Codas

With the prototype for each of the parameters established, Section 7.4 is concerned with the deviation of Beethoven's codas from the identified prototypes: i.e., how far Beethoven's codas are, numerically, from the prototype. Are the codas good examples of the prototype or are there numerical anomalies? With the exception of the structural parameters, Section 7.3 (p. 308) revealed only a small number of significant differences between Beethoven's codas in the first and final movements. As a result, and with the exception of the structural parameters, codas from both movement types will be compared against the combined average prototype. This process will identify codas which align with the prototype, including the most-conformant coda, whilst also identifying and exploring any codas which represent significant statistical anomalies. Although the first and final movements do not appear to have any significant differences *between* them with regard to their harmonic, thematic and orchestrational organisation, the data in this section will identify if there is a greater deviation in coda organisation from the prototype *within* either the first or the final movements (i.e., although the parameter averages for the first- and final-movement codas are broadly the same, the range of the data may be different).

7.4.1 Spread of Codas with regard to the Structural Proportions Prototype

The figures presented in this section represent the ranking of the absolute and proportional length of the coda with regard to the movement to which it is attached. In contrast to

Chapters Five and Six, Section 7.3 (p. 308) identified significant differences between the proportions of the coda in Beethoven's first and final movements. As a result, the coda data are compared against the movement prototypes (Table 7.1), rather than the combined-movement prototypes (Figures 7.1 and 7.2). Figures 7.6a and 7.6b show the percentage-point deviation from the prototype for the structural proportions of Beethoven's first- and final-movement codas. The larger the percentage, the greater the distance from the prototype the coda is situated. The vertical baseline (0%) represents the prototype.

Figure 7.6a – Deviation of Beethoven's first-movement codas from the structural proportions prototype.

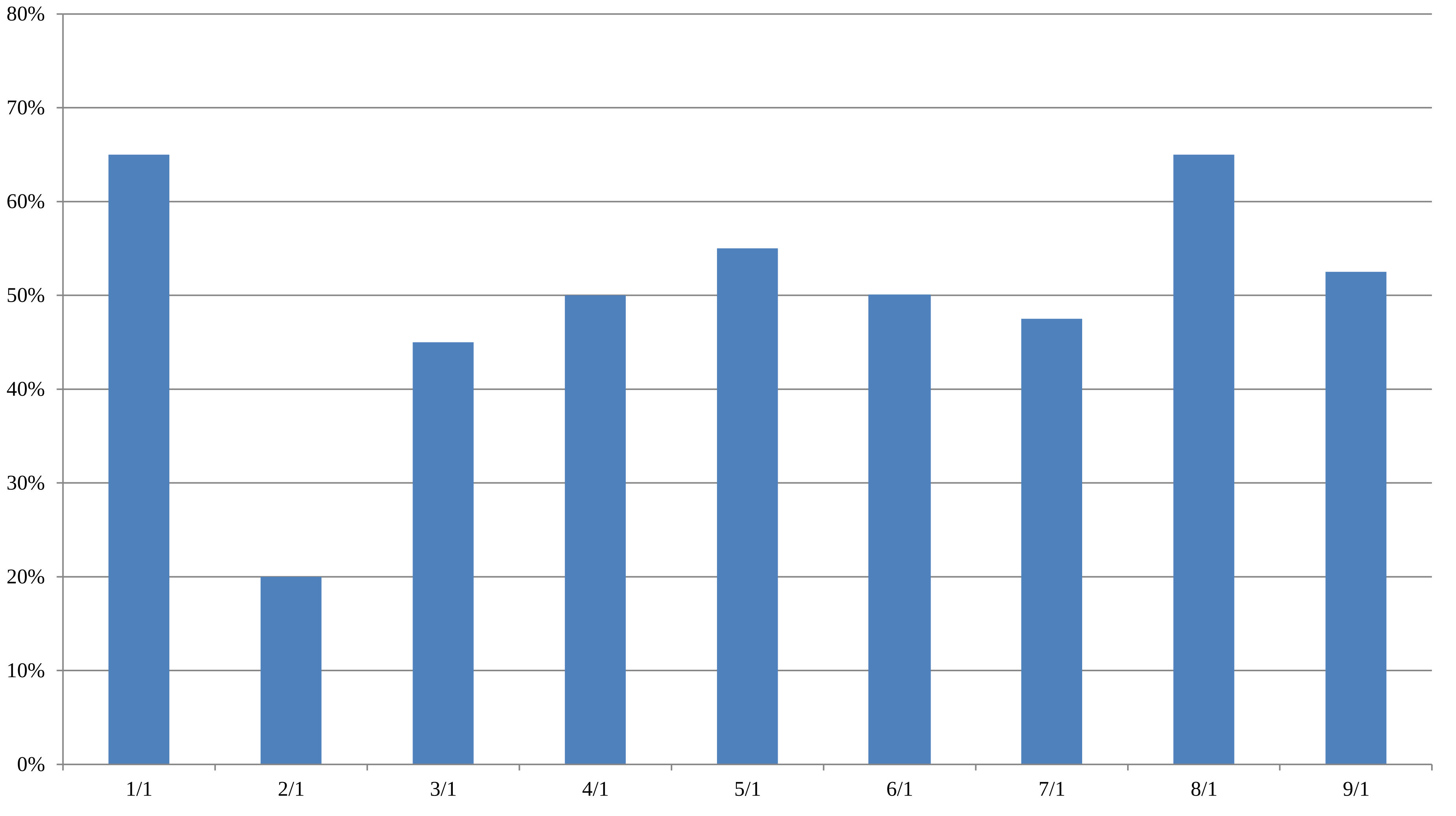
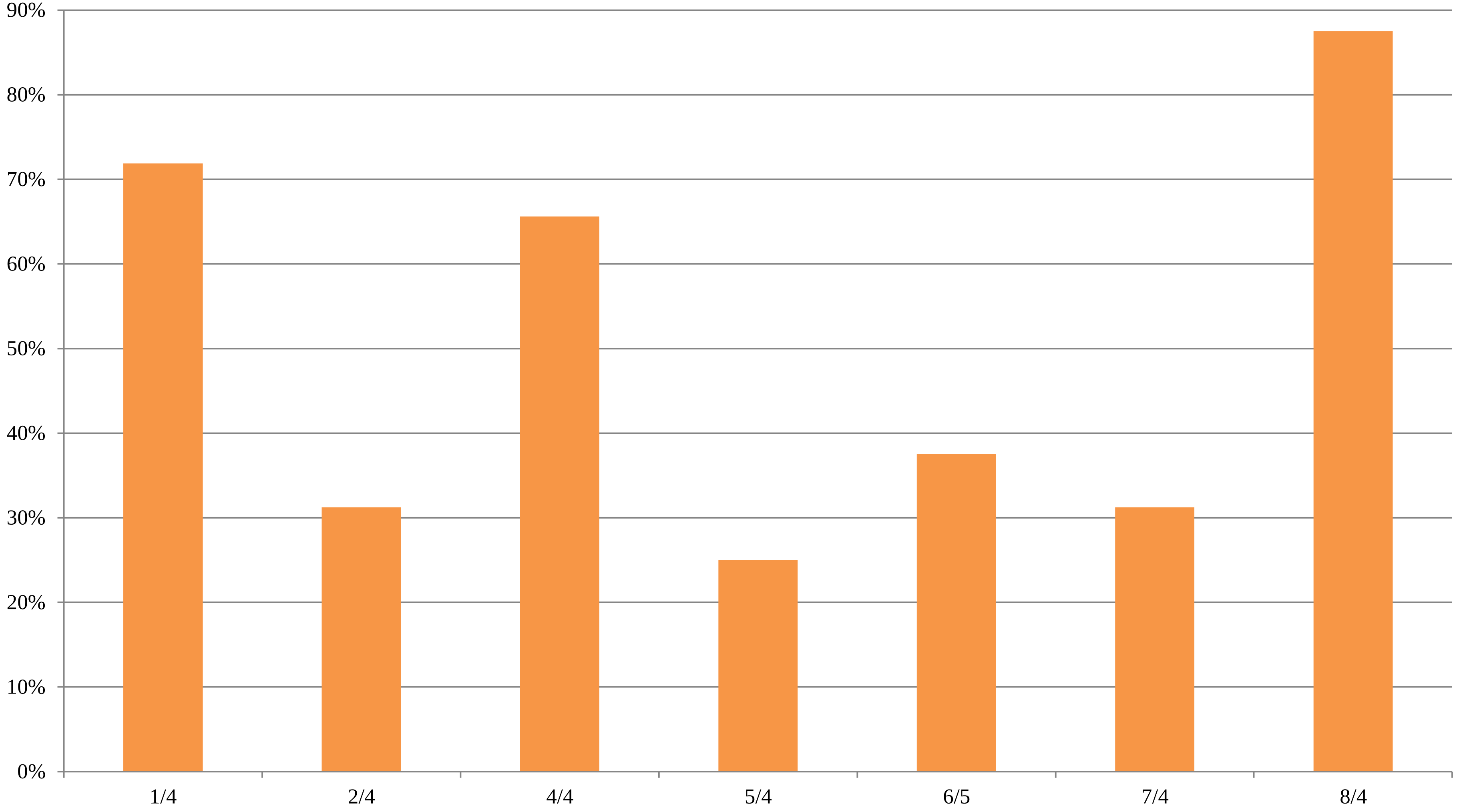


Figure 7.6b – Deviation of Beethoven's final-movement codas from the structural proportions prototype.



The Codas Most Conformant to the Structural Prototype

Of the data in Figures 7.6a and 7.6b, B/2/1 (Figure 7.6a) is calculated as the most conformant to the first-movement prototype established in Table 7.1, whilst B/5/4 (Figure 7.6b) is calculated as the most conformant to the final-movement prototype. Of these two codas, B/2/1 is the most conformant, being 20 percentage-points from the prototype (five percentage-points closer than B/5/4). With regard to the conformity of the sample to the prototype, the spread of the data in Figures 7.6a and 7.6b show that there is little difference in the number of conforming first and final movements. Four of the seven (57%) final-movement codas are within 50 percentage-points (mean) of the prototype, in comparison with five of the nine (56%) first-movement codas. However, there is a larger range (63%) between the most- and least-conformant coda in Beethoven's final-movements. This result can be explained by the presence of the coda from B/8/4 (which ranks as the least conformant for all structural parameters) in the sample.

B/2/1

Given that B/2/1 contains an introduction, it is compared against the column of data labelled 'First Movement Prototype with Introduction' from Table 7.1. At 57 bars long, not only is the raw length of the coda of B/2/1 only five bars longer than the prototype, but the coda is also proportional to 12% of the movement, only two percentage-points smaller than the prototype. The proportions for the rest of the movement are also very similar to the prototype (Table 7.1). The exposition is only two percentage-points larger than the prototype, the development is three percentage-points smaller, and the recapitulation is one percentage-point smaller. Overall, structurally, B/2/1 is a strongly conformant example of the prototype data.

B/5/4

The structural data for B/5/4 is compared against the column of data labelled 'Final Movement Prototype' from Table 7.1. Although only the third most-conformant coda with regard to raw length (the codas from B/7/4 and B/2/4 are more conformant), B/5/4 is the most-conformant coda with regard to proportional length. At 29% of the movement, the coda of B/5/4 is within one percentage-point of the final movement prototype (Table 7.1). In comparison with B/2/1, B/5/4 does not resemble the prototype structural proportions for the rest of the movement as closely. The exposition of B/5/4 is two percentage-points smaller than the prototype, the development is six percentage-points larger, and the recapitulation is five percentage-points smaller.

The Codas Least Conformant to the Structural Prototype

From the data in Figures 7.6a and 7.6b, B/1/1 and B/8/1 (Figure 7.6a) are the least conformant to the first-movement prototype established in Table 7.1, whilst B/8/4 (Figure 7.6b) is the least conformant to the final-movement prototype. Of these three codas, B/8/4 is the least conformant, being 88 percentage-points from the prototype, 23 percentage-points more than B/1/1 and B/8/1.

B/8/4

The structural data for B/8/4 is compared against the column of data labelled 'Final Movement Prototype' from Table 7.1. In comparison with the prototype, the coda of B/8/4 is significantly larger both physically and proportionally. The coda is 236 bars in length and is proportional to 47% of the movement. Observation of the structural proportions of this movement suggests that to accommodate this larger coda, the proportional size of the exposition and development is reduced. This supports the earlier suggestion (Section 7.3.1, p. 309) that a proportionally larger coda is balanced by a proportionally smaller exposition in Beethoven's final movements.

B/1/1 and B/8/1

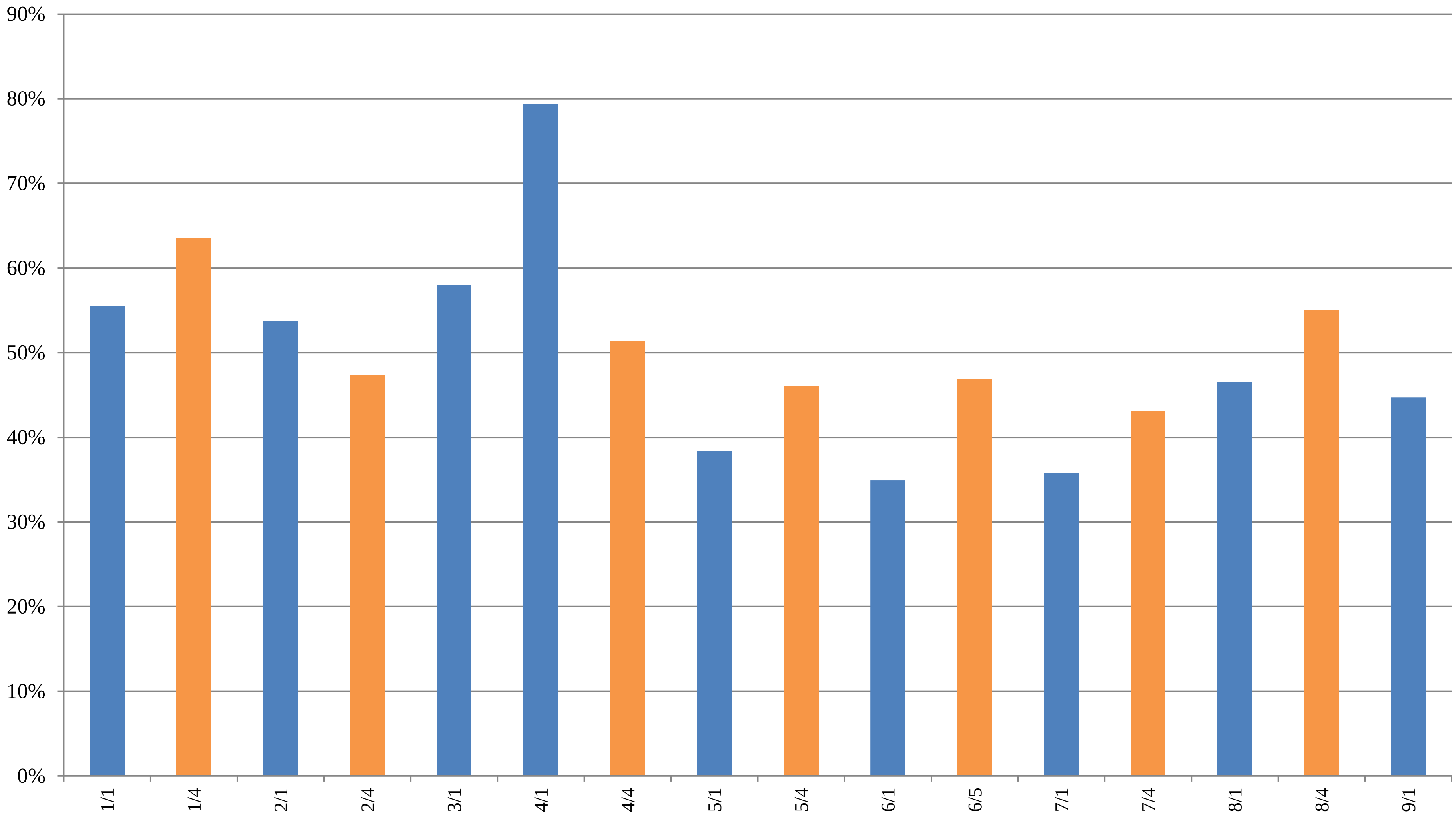
The structural data for B/1/1 are compared against the column of data labelled 'First Movement Prototype with Introduction' from Table 7.1, whilst B/8/1 is compared against the column labelled 'First Movement Prototype without Introduction'. Whereas B/8/4 is identified as the least-conformant coda owing to its large raw length and proportional size, B/1/1 and B/8/1 are identified as the least-conformant codas owing to their smaller than average raw length and proportional size. In B/1/1, the coda is only 40 bars in length (12 bars smaller than the prototype) and is proportional to 10% of the movement (four percentage-points less than the prototype). The rest of the movement comprises a longer than average introduction and exposition, and a shorter development and recapitulation.

Similarly, in B/8/1, the coda is only 73 bars in length (38 bars smaller than the prototype) and is proportional to 15% of the movement (three percentage-points less than the prototype). As with B/1/1, the exposition of B/8/1 is longer than the prototype and the development is shorter, but the recapitulation is longer than the prototype.

7.4.2 Spread of Codas with regard to the Harmonic Prototype

The figures presented in this section represent the ranking of each chord used, the chord diversity, the harmonic rhythm, and the harmonic gradient. Figure 7.7 shows the percentage-point deviation from the combined prototype (Figure 7.3) for the harmonic data of Beethoven's codas. The blue bars represent the first-movement codas, whilst the orange bars represent the final-movement codas.

Figure 7.7 – Deviation of Beethoven's codas from the harmonic prototype.



With regard to the harmonic organisation of Beethoven's codas, B/6/1 is the most conformant to the prototype, whilst B/4/1 is the least conformant. As with the structural proportions, there is very little difference in the spread of the first- and final-movement codas from the prototype. Fifty-six percent of the first-movement codas are located less than 50 percentage-points (mean value) from the prototype, in comparison with 57% of the final-movement codas. Table 7.5 identifies the most- and least-conformant codas for each of the aspects investigated with regard to the harmonic parameter.

Table 7.5 – Most- and least-conformant Beethoven codas for individual harmonic parameters.

Proportion of Chord:	Most-Conformant Coda(s)	Least-Conformant Coda(s)
I	B/7/1	B/4/1
ii	B/9/1	B/2/4
IV	B/1/4	B/2/4
V	B/6/1	B/1/1
vi	B/7/4	B/1/1
V/IV	B/8/4	B/7/4
V/V	B/6/1	B/6/5
Dim7	B/2/4	B/9/1

Chord Diversity	B/7/1, B/7/4, B/8/1	B/4/1
Harmonic Rhythm	B/4/4	B/4/1
Harmonic Gradient	B/7/4	B/1/1

The Coda Most Conformant with regard to Chord Diversity

Although the most-conformant coda with regard to the harmonic data collected, B/6/1 is not the most prototypical example with regard to chord diversity. The prototype shows that Beethoven's codas are constructed, on average, of nine chord types, as in B/7/1. However, B/6/1 contains seven chord types, including tonic, dominant, subdominant, submediant, supertonic and two secondary-dominant chords.

The Coda Most Conformant with regard to the Chord Proportions

With regard to the individual proportions of chords, B/6/1, although ranking close to the prototype, contains five percentage-points more tonic and three percentage-points less supertonic harmony than the prototype. However, B/6/1 is the most-conformant example for the proportion of dominant and secondary-dominant chords, with the values matching the prototype. The most interesting percentage difference between B/6/1 and the prototype (Figure 7.3) is the proportion of subdominant chords. B/6/1 contains eight percentage-points more subdominant harmony than the prototype. Given the programmatic nature of B/6, it is likely that this increased proportion of subdominant harmony is to emphasise the 'pastoral' in the movement. This statement is supported by Kishlansky, who suggests that the increased proportion of subdominant, primarily located in the ECM 'reflects Beethoven's desire to portray the "pastoral" in this movement' (2014, p. 23).

The Coda Most Conformant with regard to Harmonic Rhythm

The harmonic rhythm in Beethoven's codas is, on average, 0.76 chords per bar. B/4/4 is the most-conformant coda for harmonic rhythm (0.72). With the exception of three examples (B/2/4, B/8/4 and B/9/1), all of Beethoven's codas contain a harmonic rhythm of less than one chord per bar. B/6/1 ranks 4th from the prototype with a harmonic rhythm value 0.04 smaller than B/4/4. The harmonic rhythm value is smaller because of the uninterrupted passages of subdominant (bb. 428–436) and tonic (bb. 441–448) harmony.

The Coda Most Conformant with regard to the Harmonic Gradient

The harmonic gradient of the coda in B/6/1 is 4th from the prototype. A gradient can be located between the range of +1 and -1 (Section 2.4.2, p. 76). Given that the gradients of

Beethoven's codas only have a small range of 0.064 (-0.0689 to -0.0049), it could be suggested that they follow a similar trend regarding harmonic progression. This is somewhat to be expected, as discussed in Section 4.2.4 (p. 173), because a key principle of the coda involves the section ending on the tonic. As with Haydn and Mozart, the variation in range is created through the diversity of harmonic progressions in the codas leading to the tonic, and the speed at which the coda progresses to the tonic.

The Codas Least Conformant with regard to the Harmonic Prototype

Calculated as containing the least-conformant coda with regard to the harmonic prototype, B/4/1 provides contrasting data to B/6/1 for the harmonic organisation of the coda. Given that this coda is constructed of just tonic and dominant chords, the proportions of chords are significantly different from the prototype, with 24 percentage-points more tonic harmony and nine percentage-points more dominant harmony. Given this exclusive focus on tonic and dominant chords, the coda of B/4/1 contains a chord diversity value of two, ranking 16th in the sample from the prototype. In addition, it contains the slowest (0.29), least-conformant harmonic rhythm (16th), and an almost flat (0.005) harmonic gradient (14th).

Harmonic Proportions and Raw Coda Length

By organising the codas into the upper, middle and lower tertiles with regard to their length, it is possible to identify the different harmonic proportions dependent on the length of the coda. Table 7.6 shows the average harmonic data for the three tertiles of codas, organised with regard to the raw length of the coda.

Table 7.6 – Tertile ranges showing the difference in coda harmonic organisation according to coda size.

	Raw Coda Length (bars)	Mean							
		Proportion (%)					Chord Diversity	Harmonic Rhythm	Harmonic Gradient
		I	ii	IV	V	vi			
Lower Tertile	0–50	64	3	3	21	5	5	0.4	-0.037
Middle Tertile	51–100	41	5	5	28	2	10	0.73	-0.021
Upper Tertile	101–236	34	4	9	26	4	15	0.89	-0.016

Table 7.6 shows that as the absolute size of Beethoven's codas increase, the percentage of tonic harmony decreases and the proportion of subdominant harmony increases. The percentage of dominant harmony also increases, reaching a peak in the middle tertile. Furthermore, a wider range of chords is present in Beethoven's larger codas and the harmonic rhythm becomes faster. The harmonic gradient becomes weaker, suggesting that, although still necessary, the primary focus of Beethoven's larger codas is no longer just to arrive at and reinforce the tonic. This hypothesis is supported by the wider chord diversity and the reduction in the proportion of tonic harmony. As with Haydn's codas, the increased chord diversity may be explained by more diverse thematic material used in Beethoven's larger codas.

7.4.3 Spread of Codas with regard to the Thematic Prototype

The percentages presented in this section represent the ranking of the different thematic material used (e.g., EFS, DM and TM) and the thematic diversity (the number of thematic sources) in Beethoven's codas. Figure 7.8 shows the percentage-point deviation from the prototype (Figure 7.4) for the thematic data of Beethoven's codas. Across the parameters measured, B/2/4 is the most conformant to the prototype (38 percentage-points from the prototype), whilst B/5/4 is the least conformant (62 percentage-points from the prototype). As with the spread of codas from the prototype with regard to the structural and harmonic parameters, there appears to be an equal percentage of first-movement codas and final-movement codas conformant with the thematic prototype. Forty-four percent of the first-movement codas are within 50 percentage-points (mean value) of the prototype, only one percentage-point more than the final-movement codas.

Figure 7.8 – Deviation of Beethoven's codas from the thematic prototype.

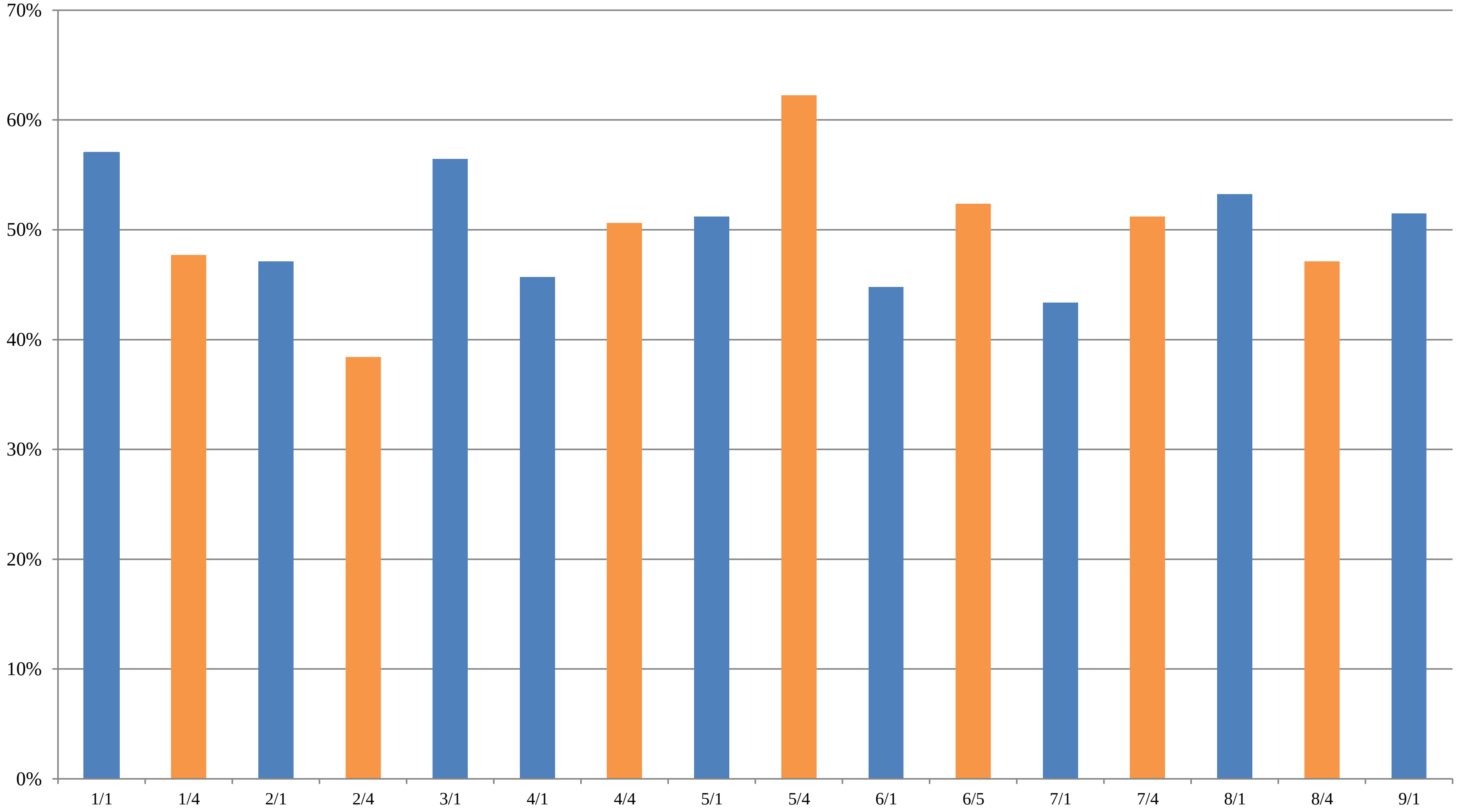


Table 7.7 shows the most- and least-conformant codas for each of the aspects investigated in representation of the thematic parameters.

Table 7.7 – Most- and least-conformant Beethoven codas for individual thematic parameters.

Use of:	Most-Conformant Coda(s)	Least-Conformant Coda(s)
IM	n/a	B/1/4
EFS	B/4/1	B/7/1
ETM	n/a	B/7/4
ESS	B/8/4	B/5/1
ECM	B/4/4	B/6/1
DM	B/7/1	B/3/1
CM	B/1/1	B/1/4
TM	B/2/1	B/1/1
Thematic Diversity	B/2/1, B/2/4, B/4/4, B/6/1, B/6/5, B/7/1	B/1/1, B/5/1

The Coda Most Conformant with regard to the Proportions of Thematic Material

Although not containing ETM, ESS or ECM, the coda from B/2/4 provides conformant data for the use of DM, CM and TM. The proportion of DM is only three percentage-points less than the prototype, ranking 3rd in the sample. The proportion of CM is three percentage-points more than the prototype, ranking 5th in the sample. The proportion of TM is five percentage-points more than the prototype, ranking 4th in the sample. These differences between B/2/4 and the prototype are relatively small. The largest deviation from the prototype for these sub-parameters measures 27 percentage-points, 22 percentage-points, and 40 percentage-points, respectively. The coda from B/2/4 also incorporates the use of EFS. However, the data is 30 percentage-points from the prototype, making B/2/4 the third least-conformant coda with regard to the proportional use of EFS.

Although B/2/4 contains the most-conformant coda for the thematic parameter, it is not the most-conformant coda for any of the thematic sub-parameters in isolation. With regard to the use of DM, B/6/1 and B/7/1 are more conformant with the prototype. Observation of the positioning of the different thematic materials in this sample highlights some structural similarities with regard to the use and position of thematic material in Beethoven’s codas.

Use of Thematic Material in the Coda

B/4/1 provides a thematic template for the order of thematic material used in Beethoven’s codas. Using only tonic and dominant chords, it begins with 12 bars of ECM (bb. 451–462) followed by 20 bars of EFS (bb. 463–482). It closes with eight bars of CM (bb. 483–490) and eight bars of TM (bb. 491–498). This thematic arrangement (ECM–EFS–CM–TM) can only be found in this coda. However, variations of this arrangement can be found in the remaining Beethoven codas.

Unlike B/4/1, the coda in B/1/1 begins with 12 bars of EFS. This is followed by seven bars of CM based on the EFS cadence found in bb. 31–33. This material is then followed, and the coda concluded, with 20 bars of TM. Compared with B/4/1, the coda of B/1/1, although not commencing with ECM, does otherwise follow the same thematic arrangement (EFS–CM–TM). Not only are both of these codas constructed using thematic material taken from analogous points in their respective expositions, but it would appear that both operate, amongst other potential thematic functions, to re-familiarise the listener with the main subject material before bringing the movement to a close.

The same thematic arrangement (ECM–EFS–CM–TM) can be found in the codas from B/7/1 and B/8/1, with small alterations. The coda in B/7/1, identified as the most conformant with regard to the proportions of DM and the second most conformant with regard to ECM, begins with 36 bars of EFS (bb. 391–426) followed by five bars of DM (bb. 427–431). Following these statements, the coda progresses following the thematic arrangement found in B/4/1. The coda contains six bars of ECM (bb. 432–437), eleven bars of EFS (bb. 438–448) and concludes with two bars of CM (bb. 449–450). In contrast to B/4/1, B/7/1 does not contain any TM. In this example, the TM is subtracted from the B/4/1 template and additional thematic material is added (EFS and DM).

B/8/1 also contains the thematic arrangement found in B/4/1, with variation. In B/8/1 the coda begins with ten bars of ECM (bb. 301–310). This is followed by 19 bars of EFS (bb. 311–329) and three bars of CM (bb. 330–332). Up to this stage in the coda the thematic arrangement mirrors that found in B/4/1. However, after the three bars of CM, there is a further passage of ECM (bb. 333–350) and another passage of CM (bb. 351–358). The coda concludes with 13 bars of TM. In this example, rather than additional thematic material before and/or after the thematic template found in B/4/1 (as in B/7/1, the additional thematic material is located within the thematic template.

At their core, Beethoven's codas all appear to contain some variation on the thematic template found in B/4/1 (ECM–EFS–CM–TM). These variations may involve:

- the subtraction of thematic material from the template, as found in:
    - B/1/1 (EFS–CM–TM),
- the addition of thematic material within the template, as found in:
    - B/8/1 (ECM–EFS–CM–ECM–CM–TM),
- the addition of thematic material before and/or after the canonical, or abbreviated template, as found in:
    - B/6/1 (DM–EFS–ECM–CM–ECM–EFS–CM–TM–EFS–TM),
    - B/7/1 (EFS–DM–ECM–EFS–CM),
- the addition of thematic material within, and before and/or after the canonical, or abbreviated template, as found in:
    - B/2/1 (DM–EFS–LP–CM–TM–CM–TM),
    - B/7/4 (EFS–ETM–EFS–CM–ETM–CM–TM).

The Coda Least Conformant with regard to the Proportions of Thematic Material

Identified as the least conformant, that from B/5/4 contains material from the EFS proportional to only 7% of the coda. This is 34 percentage-points lower than the prototype, ranking 15th in the sample. This reduction is balanced by a larger proportion of CM (14 percentage-points more than the prototype) and TM (nine percentage-points more than the prototype). Based on the thematic proportions in B/5/4 it would appear that the focus of this coda is to create a grand and climatic ending to the movement and work, rather than to restate material from the exposition in detail. Rosen suggests that this long coda, and in particular the final 'unbelievably long' C major cadence, is needed 'to ground the extreme tensions of this immense work' (2005, p. 72).

Although proportionally non-conformant and containing larger proportions of CM and TM rather than EFS, the coda from B/5/4 still resembles the template of the coda in B/4/1. However, the order of the template is changed (ECM–CM–EFS–TM) and, as with B/6/1, there is additional thematic material before and after it.

Thematic Proportions and Raw Coda Length

The size of the coda also affects the thematic material used. A shorter coda, such as that of B/1/1, focuses around the EFS, with CM and TM added. Conversely, in a larger coda such as B/5/4, there is more opportunity to incorporate larger amounts of thematic material from different sources. A comparison of the correlations between the raw length of the coda and the proportional percentage of thematic material used shows a number of positive and negative trends. These are summarised in Table 7.8, which shows the average thematic data for the three tertiles of codas organised with regard to the raw length of the coda.

Table 7.8 – Tertile ranges showing the difference in coda thematic organisation according to coda size.

	Raw Coda Length (bars)	Mean					
		Proportion (%)					Thematic Diversity
		EFS	ECM	CM	TM	Other[40]	
Lower Tertile	0–50	36	13	17	33	0	4
Middle Tertile	51–100	41	16	20	8	15	5
Upper Tertile	101–236	43	3	15	6	32	5

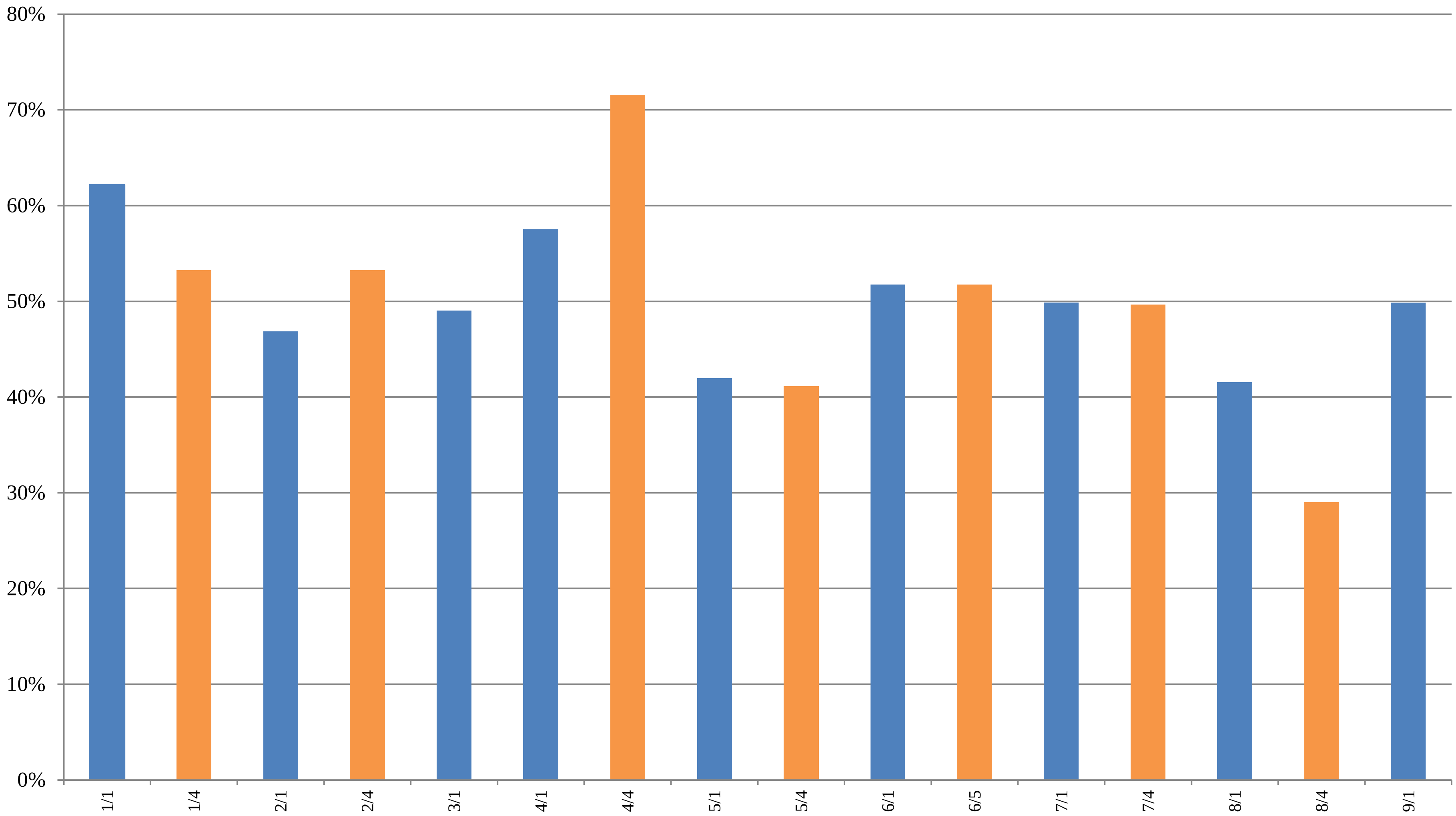
As Table 7.8 shows, the upper tertile of codas (those over 101 bars in length) is constructed with a higher proportion of EFS and the thematic material grouped under 'other'. In comparison, the lower tertile (codas under 50 bars in length) contains the largest proportion of TM, and the middle tertile (codas between 51 and 100 bars in length) contains the largest proportion of ECM and CM. The data suggest that, as the codas increase in size, the proportions of EFS, IM, ETM, ESS and DM also increase. However, whilst there is a slight increase in the proportions of ECM and CM in the middle tertile, the proportions of ECM, CM and TM decrease in Beethoven's longer codas. Given the lack of 'other' thematic material (e.g., IM and ESS) in the lower tertile, it is no surprise that the thematic diversity (i.e., the number of different thematic sources) is lowest in Beethoven's shorter codas.

7.4.4 Spread of Codas with regard to the Instrumentation and Orchestration Prototype

The values presented in this section represent the ranking of each instrument used, the overall percentage orchestration (the average number of instruments used per bar) and the orchestration gradient in Beethoven's codas. Figure 7.9 shows the deviation from the prototype (Figure 7.5) for the instrumentation and orchestration data of Beethoven's codas.

[40] Given their generally reduced use, IM, ETM, ESS and DM are combined in this column.

Figure 7.9 – Deviation of Beethoven's codas from the instrumentation and orchestration prototype.



B/8/4 is the most conformant to the prototype, whilst B/4/4 is the least conformant. With regard to the spread of the codas from the prototype, there appears to be a greater percentage of first-movement codas conformant with the prototype than the percentage of final-movement codas. Sixty-seven percent of the first-movement codas are within 50 percentage-points of the prototype, whereas only 43% of the final-movement codas are within this range. Table 7.9 shows the most- and least-conformant codas for each of the aspects investigated for the instrumentation and orchestration parameter.

Table 7.9 – Most- and least-conformant Beethoven codas for individual instrumentation and orchestration parameters.

Use of:	Most-Conformant Coda(s)	Least-Conformant Coda(s)
Flute	B/5/1	B/6/1
Oboe	B/5/1	B/4/4
Clarinet	B/9/1	B/2/4
Bassoon	B/9/1	B/4/4
Horn	B/7/4	B/9/1
Trumpet	B/8/4	B/6/1
Timpano	B/7/1	B/3/1
First Violin	B/6/1	B/8/1
Second Violin	B/7/1	B/4/4
Viola	B/3/1	B/4/1
Cello	B/4/1	B/8/1
Double Bass	B/6/1	B/4/4
Piccolo	B/5/4	
Contrabassoon	B/5/4	
Trombone	B/5/4	

Total Percentage Orchestration	B/2/4, B/5/1	B/4/4
Orchestration Gradient	B/8/1	B/1/1

Observation of the most conformant coda suggests that Beethoven's codas are heavily orchestrated, with an average of nine out of twelve instruments in B/8/4 sounding in each bar (75%). Furthermore, every coda in the sample concludes with an orchestral *tutti* (100%). Based on the prototype, it would appear that the level of orchestration reflects the thematic material used in the coda. CM and TM are almost always orchestrated with a *tutti* orchestration, whilst material from the exposition or development either reflects the original orchestration used or contains slightly lighter and more diverse levels of orchestration. B/8/4, given its conformity to the prototype for both the use of thematic material (5^{th} from the prototype) and the orchestration of the coda (most conformant), provides a good example of this relationship.

The beginning of the coda from B/8/4 commences with DM (bb. 267–281). During these 15 bars the instrumentation varies from viola (b. 267), to first and second violin (b. 269), to full string section (b. 279). The total orchestration here does not exceed 67%. This material is followed by an extended passage of EFS (bb. 282–345). During this passage the orchestration again varies from first and second violin (b. 283) to clarinet, bassoon and strings (b. 299), to orchestral *tutti* (b. 314). Overall, the total average orchestration increases to 74% during this passage. Following the EFS, another passage of DM (bb. 346–355) is presented. The total average orchestration decreases to 58% with bars that contain reduced instrumentation (i.e., bassoon and first violin (b. 352)). Another extended passage of EFS (bb. 356–407) is presented after the DM and the total average orchestration again increases to 79%. This passage of EFS is followed by a 20-bar passage of ESS (bb. 408–427) with an average total orchestration of 82%. Following four bars of CM (98% average total orchestration), six bars of ECM (97%), and a *tutti* pause (b. 438), the average total orchestration falls to 17% with just two bassoons and horns sounding (b. 438). From this point of the coda, the average total orchestration increases towards its conclusion. Following another passage of expanded and varied EFS (bb. 439–479), again with an average total orchestration of 72%, the coda concludes with 15 bars of TM (bb. 480–481 and bb. 490–502) and eight bars of CM (bb. 482–489). The average total orchestration for these passages is 99%, with just the removal of the timpani in two bars (bb. 483 and 485).

Even in the less conformant examples, the coda still aligns with this generalised hypothesis. B/4/4 is identified as the least-conformant coda from the prototype for the proportional use of the oboe, bassoon, second violin and double bass, and the total percentage orchestration. Although this coda is the least conformant, it continues to follow the generalised hypothesis stated above. As with B/8/4, the coda of B/4/4 begins with 20 bars of DM (bb. 278–297), which has a total orchestration average of 42%. This percentage increases to 56% for the first statement of EFS (bb. 298–301) before increasing to 98% for the 17-bar passage of CM (bb. 302–318). Following this 'false ending', the instrumentation reduces to cello and double bass before increasing through the second statement of EFS (bb. 319–326). The total orchestration average reaches 64% in a statement of ESS (bb. 327–334) before increasing to 85% for a passage of ECM (bb. 335–341). After another 'false ending' (bb. 342–345), the total orchestration average again falls, this time to 8%, with just first violin playing (bb. 345–348). The orchestration then rapidly increases for the final orchestral *tutti* passage of CM (bb. 354–355).

Instrumentation/Orchestration and Raw Coda Length

As with the harmonic and thematic data, relationships exist between the instrumentation and orchestration of the coda and its raw length. Table 7.10 shows the average instrumentation and orchestration data for the three tertiles of codas organised according to the raw length of the coda.

Table 7.10 – Tertile ranges showing the difference in coda instrumentation and orchestration according to coda size.

		Lower Tertile	Middle Tertile	Upper Tertile
	Raw Coda Length (bars)	0–50	51–100	101–236
	Total Percentage Orchestration (%)	86	73	79
	Orchestration Gradient	0.009	0.005	0.002
Proportion (%)	Flute	92	73	76
	Oboe	90	67	82
	Clarinet	85	72	73
	Bassoon	89	80	83
	Horn	80	67	77
	Trumpet	75	41	60
	Timpano	72	38	56
	First Violin	95	87	91
	Second Violin	95	84	91
	Viola	89	83	89
	Cello	83	84	92
	Double Bass	83	77	88

With the exception of the cello, the proportion of instruments used is the smallest in the middle tertile (codas with a length between 51 and 100 bars). This trend is, not surprisingly, also reflected in the total orchestration. The spread of the data across the three tertiles could suggest that the middle-tertile codas are more experimental with regard to orchestration, whilst the lower tertile contain a fuller, unchanging orchestration. The upper tertile, which contains proportions larger than the middle tertile but smaller than the lower tertile, contains a combination of both forms of orchestration. However, it is also possible that these figures are reflective of the larger proportions of certain types of thematic material in the coda. For example, CM and TM in Beethoven's codas, with few exceptions, are often given a *tutti* orchestration. Given the larger proportion of CM and TM in the lower tertile of codas (Table 7.8), it is not surprising to find that this tertile also contains larger proportions of instruments and a higher total orchestration average. In contrast to CM and TM, material from the exposition and DM tends to contain smaller instrumentation proportions and thus a lower total orchestration average. For example, the first 15 bars of B/8/4 (bb. 267–281), which comprises DM, only contain a total orchestration average of 26%. The larger proportions of this category of thematic material in the upper tertile, and the lack of it in the lower tertile, explain the lower instrumentation data in the upper tertile presented in Table 7.10.

7.5 The Meta-Prototypical Beethoven Coda

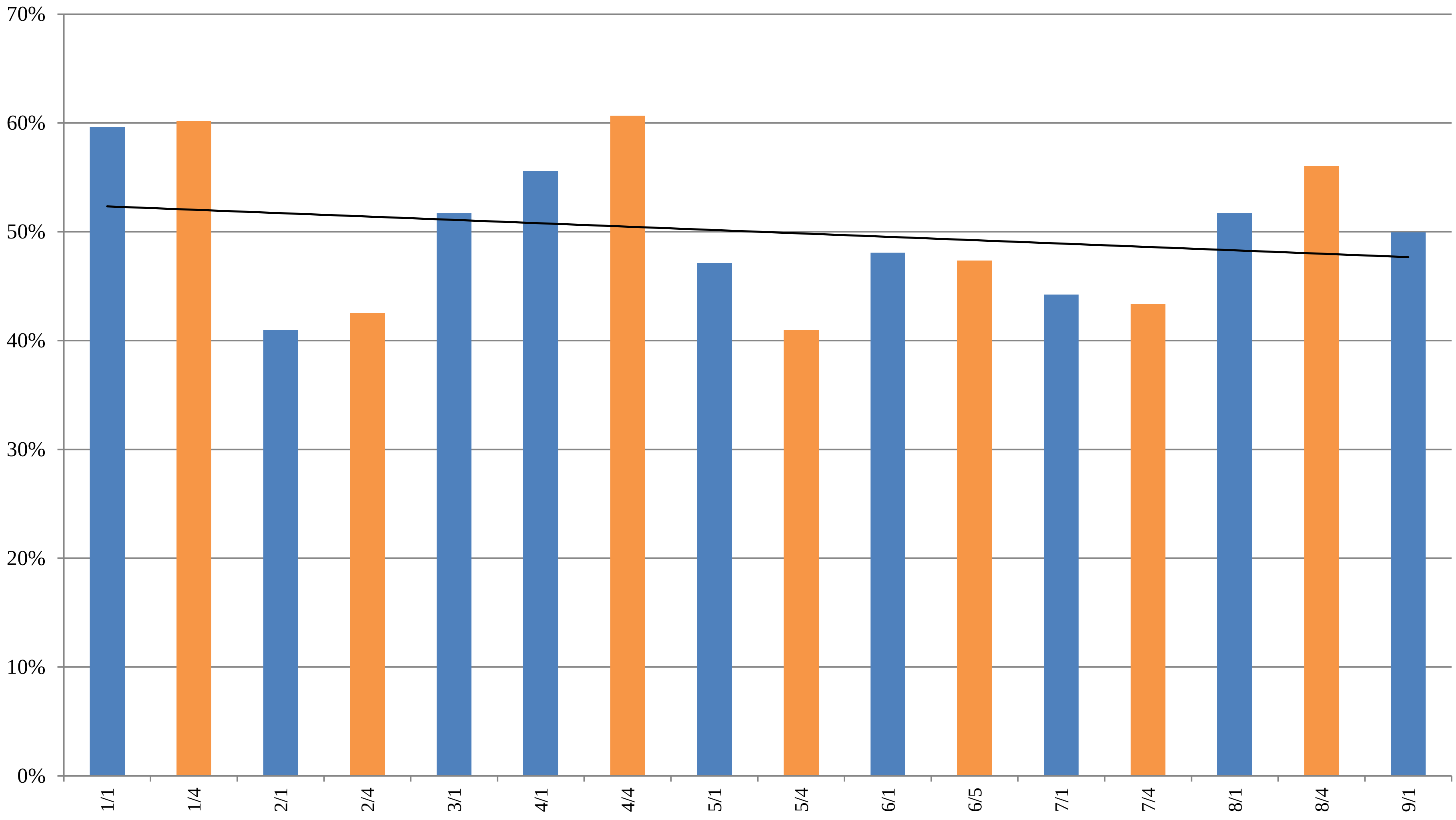
Having established the most- and least-conformant codas for the four parameters investigated in isolation, the final stage of the prototype investigation for the coda in Beethoven's symphonies is to combine the data for the four parameters and to calculate the meta-prototypical coda. Table 7.11 summarises these for the four parameters investigated.

Table 7.11 – Most- and least-conformant Beethoven codas with regard to the four parameters investigated.

Parameter	Most-Conformant Coda	Least-Conformant Coda
Structure	B/2/1	B/8/4
Harmony	B/6/1	B/4/1
Thematic Material	B/2/4	B/5/4
Instrumentation/Orchestration	B/8/4	B/4/4

So that the parameters receive equal weighting when the combined parameter prototype is calculated, the sum of the rank data is divided by the total number of individual parameters studied. For example, the sum of the rank data for structure is divided by two, because it is the sum of two individual parameters (raw coda length and proportional coda length). Figure 7.10 shows the percentage-point deviation from the combined parameter prototype for Beethoven's codas. Figure 7.10 incorporates the different first and final movement ranked data for the structural proportions of Beethoven's codas.

Figure 7.10 – Deviation of Beethoven's codas from the combined parameter prototype.



While the line of best fit in Figure 7.10 suggests that Beethoven's codas *become more conformant with the prototype* over time, unlike Haydn and Mozart, a test for correlation between the final percentage-point deviation from the prototype and time does not reveal a significant correlation. From this statistical data, and the similar data collected for Haydn and Mozart (Sections 5.5 (p. 243) and 6.5 (p. 291)), it can be suggested that the most significant development of the coda is found in the symphonies of Haydn and Mozart, with Beethoven's symphonies demonstrating a peak, and/or possible plateau. This is not to suggest that Beethoven's codas follow a standardised format. However, with a basic underlying format for the coda established towards the end of Haydn's and Mozart's careers, Beethoven's symphonic first and final movements arguably contain more experimentation within a recognised structural section, rather than focusing on the development and establishment of that section.

The percentage of movements less than 50 percentage-points (mean) from the prototype is higher in Beethoven's first movements. 71% of Beethoven's first movements are within 50 percentage-points of the prototype, in comparison with 57% of the final movements. Two out of the three most-conformant codas (B/2/4 and B/5/4) and two out of the three least-conformant codas (B/1/4 and B/4/4) can all be found in the final movements. Not only do the final-movement codas provide a good template for a prototypical coda, but they also contain Beethoven's least-conformant codas.

7.5.1 The Most-Conformant Coda

B/5/4 is calculated as the most prototypical. This coda ranks as the second closest to the prototype for the structural proportions, the sixth most prototypical for the harmonic data, and the second for the use of instrumentation and orchestration. The only parameter for which B/5/4 is not a strongly prototypical example is the use of thematic material. For this parameter, the coda is the least conformant of the whole sample, being 62 percentage-points from the prototype. This figure is explained by the smaller percentage of EFS and larger percentage of

CM in the coda (34 percentage-points and 14 percentage-points, respectively). A description of the coda from B/5/4, below, provides an outline of a prototypical Beethoven coda.

The coda of B/5/4, which is 151 bars in length and proportional to 29% of the movement, opens with 14 bars of ESS (bb. 294–307) before being followed by ten bars of CM (bb. 308–317). Interestingly, as Hurwitz highlights, the ESS stated at the beginning of the coda is absent from the development section (2008, p. 82). Beethoven reserves the development restatement of ESS for the coda (2008, p. 82). This material centres on the dominant with decreasing orchestration. Throughout these two thematic passages, the harmony focuses around the tonic, subdominant and dominant. The orchestration builds during the statement of ESS reaching a total orchestration of 93% in b. 302 (i.e., 14 out of the 15 instruments are sounding in each bar). This material is followed by statements and expansions (bb. 318–349) of material taken from bb. 26–42 of the exposition (ETT) and a decrease in the orchestration. The total orchestration of bb. 318–332 averages 61%. However, bb. 335–349, which repeat the material of bb. 318–332, have an increased total orchestration average (71%). Beethoven builds the orchestration throughout these two passages, and in the following CM (bb. 350–361), leading up to the beginning of the *Presto* (b. 362).

The *Presto* of B/5/4 begins with 16 bars of ECM (bb. 362–377) and is followed by another twelve bars of CM (bb. 378–389). This passage of CM closely resembles the harmonic progression of the earlier CM in the coda (bb. 350–361). After one final statement of EFS in sequence (bb. 390–399), which is adapted to function as TM, the coda continues with 45 bars of CM and TM (bb. 400–444).

Although B/5/4 is calculated as the most-conformant coda, it is only 0.02 percentage-points more conformant than B/2/1 and it is interesting to compare the differences between the data for these two highly conformant examples. B/2/1 is the most conformant example of the structural prototype, being five percentage-points closer to the prototype than B/5/4. With regard to the harmonic and orchestration prototypes, B/2/1 is less conformant than B/5/4. The coda of B/2/1 ranks 11th from the harmonic prototype and 5th from the orchestration prototype, eight and six percentage-points more distant than B/5/4, respectively. The most significant difference between B/2/1 and B/5/4 can be found in the thematic data. B/2/1 is the fifth most conformant movement to the combined-thematic prototype, 15 percentage-points closer than B/5/4.

The identification of B/5/4 as the most-conformant meta-prototypical coda provides an example of how the statistical methodology applied in this thesis provides results which are, on occasion, counterintuitive and not necessarily reflective of a listener's phenomenological observations. Although the values of the parameters investigated in this study identify the coda in B/5/4 as the most-conformant example, the data does not engage with the deployment of these parameters, nor their subsequent interpretation by the listener. For example, although the coda of B/5/4 contains proportions of tonic and dominant harmony with a combined rank of 6.5 out of 16, the data do not reflect the heavy deployment of this harmony from b. 362 onwards, or the 29 uninterrupted tonic chords at the end of the movement (bb. 416–444). As a result, from a listener's phenomenological experience, the coda can be viewed as being protracted, with 'extraordinary original emotional power' (Cooper in Del Mar, 1999, p. v), which not only prolongs the final cadence, but may also overemphasise the tonic for the listener. Thus, a movement may contain a coda which is objectively the most conformant example with regard to the parameters studied in this thesis, but which subjectively, based on the deployment of these parameters and the coda's reception by a listener, can also be perceived as an unusual, non-conformant example. Future research which attempts to quantify the deployment of musical parameters and a listener's phenomenological experience may provide greater insight into the coda.

7.5.2 The Least-Conformant Coda

B/4/4 contains the least-conformant coda. Constructed of 78 bars, proportional to 17% of the whole movement, this coda is ranked as the 14th most-conformant coda with regard to the structural proportion data. Harmonically, this movement is ranked as the 10th most conformant, consisting of a smaller proportion of tonic harmony and a larger proportion of dominant harmony than the prototype. With regard to the thematic material, this coda ranks 9th from the prototype, containing a smaller proportion of EFS and a larger proportion of DM. Finally, this coda is the least conformant for the use of instrumentation and orchestration. B/4/4 contains the smallest average total orchestration and instrument deployment.

7.6 Changing Trends in Beethoven's Coda

With the prototype established, and the most- and least-conformant codas identified with regard to this data, the following section, through the use of the SRCT, will highlight individual parameters which undergo change over time. Given the significant differences between the structural parameters of Beethoven's first- and final-movement codas, the SRCT is applied separately to each data set.

7.6.1 Structural Correlations

With regard to the changes in the structural parameters of Beethoven's symphonies over time, the SRCT results for the raw length and proportional length of the coda in both the first and final movements, in isolation and in combination, reveal no significant results. This suggests that codas with a large proportional length and/or large raw length can be found throughout Beethoven's career. Further observations of the raw coda lengths reinforce this suggestion, with movements containing codas with a raw length more than 120 bars being found throughout the sample (i.e., B/2/4, B/3/1, B/5/1, B/5/4, B/7/4, B/8/4 and B/9/1).

7.6.2 Harmonic Correlations

With the exception of a moderate negative correlation (-0.49) between the proportion of supertonic harmony in the coda and time, no other significant relationships exist with regard to the harmonic organisation of the coda and time.

7.6.3 Thematic Correlations

With the exception of the moderate-strong negative correlation (-0.66) between the proportion of CM used in the coda and time, which suggests the presence of less CM in Beethoven's later codas, no other significant relationships exist with regard to the thematic organisation of the coda and time.

7.6.4 Orchestration and Instrumentation Correlations

With the exception of a moderate negative correlation between the deployment of the first violin and time, there appears to be no significant changes in the use of individual instruments over time. However, the orchestration gradient against time produces a 95% significant moderate negative correlation (-0.47). This result suggests that the orchestration gradient of the coda becomes smaller over time. Observation of the orchestration gradient data shows that Beethoven's earlier codas increase in orchestration towards the coda's conclusion. For example, the first 12 bars of the coda from B/1/1 (bb. 259–270) have an average total orchestration of 64%, whilst the last 11 bars (bb. 286–297) conclude with an orchestral *tutti*, an increase of 36 percentage-points. In comparison with the first half of Beethoven's codas, the data for the second half of codas suggest that the total orchestration, with the exception of B/7/1, remains at a relatively consistent percentage. For example, although B/9/1 still concludes with an orchestral *tutti*, the total percentage orchestration remains relatively consistent throughout the coda and the difference between this value at the beginning and end of the coda is smaller than the codas found in the first half of Beethoven's symphonies. The first 12 bars of the coda (bb. 427–438) have a total orchestration percentage average of 80%. This average remains the same until the orchestral *tutti* at b. 521. For B/9/1 the total orchestration percentage thus only increases by 20 percentage-points, 16 percentage-points less than the coda for B/1/1.

7.7 Summary

By using the data collected using the methodology in Chapter Two, Chapter Seven has explored the structure and function of the coda in Beethoven's first and final symphonic movements. Section 7.2 (p. 303) established a prototype for each of the four compositional parameters explored, identifying that:

- Beethoven's codas average 103 bars in length, constituting, on average, 20% of the movement.
- Beethoven's codas, on average, are constructed of nine chord types and consist of 42% tonic harmony, 26% dominant harmony and 7% subdominant harmony. The remaining 25% are constructed of supertonic, submediant, flattened submediant, diminished-seventh, and secondary-dominant harmonies.
- Thematically, on average, Beethoven's codas consist of 41% EFS, 9% ECM, 17% CM, and 10% TM.
- The total orchestration of Beethoven's codas averages 78%, with very little significant change in the orchestration throughout their duration.

As Section 7.3 (p. 308) has shown, there is a significant difference between the proportional length of the structural sections in the first and final movements, with the coda being ten percentage-points larger in Beethoven's final movements than in his first movements. As a result of these proportional differences, three structural prototypes (first movement with an introduction, first movement without an introduction and final movement), summarised in Table 7.1 (p. 309), were used to identify the most-conformant coda. With the exception of these variations in the structural proportions, and a small number of deviations in the use of

ETM and the use of the clarinet, trumpet and timpano in the first and final movements, there appear to be no other significant differences between the organisation of the coda in Beethoven's first and final movements.

With the prototype established in Section 7.2, the most- and least-conformant codas for each of the individual parameters were identified. Shown in Table 7.11, the methodology employed identified the codas in B/2/1, B/6/1, B/2/4 and B/8/4 as the most conformant for structure, harmony, thematic material and instrumentation/orchestration, respectively, and the codas from B/8/4, B/4/1, B/5/4 and B/4/4 as the least conformant, respectively. With regard to the spread of first and final movements from the prototypes, Section 7.4 (p. 316) identified that:

- The proportions of first- and final-movement codas from the structural proportions, harmonic and thematic prototypes are almost equal.
- A greater proportion of the first-movement codas are closer to the instrumentation/orchestration prototype than the final-movement codas.

As the examples in this chapter have identified, it appears that a number of underlying standard procedures exist in Beethoven's codas. Section 7.4 identified that:

- Based on the final-movement data, a longer coda is often balanced by a smaller exposition.
- Regardless of the size of the coda, the start of the coda, on average, is clearly identified by at least three of the eight criteria in alignment.
- The shorter the absolute length of the coda, the larger the proportion of tonic harmony, the smaller the proportion of subdominant and dominant harmonies, the smaller the chord diversity and the slower the average harmonic rhythm.

- Although not as standardised as the progression of thematic material in the exposition, an underlying format for coda thematic organisation does appear to exist in Beethoven's codas, namely ECM–EFS–CM–TM.
- As the codas become longer:
  - the proportion of EFS increases,
  - the proportion of ECM, CM and TM decreases,
  - the use of ETM, ESS and DM increases.
- With a slight negative difference in Beethoven's smaller codas, the number of the thematic types used in the coda remains the same.
- CM and TM are almost always orchestrated as *tutti*, whilst the material from the exposition or development either reflects the original orchestration used or contains thinner more diverse levels of orchestration.

As discussed in Section 7.5 (p. 340), by aggregating the data for all the parameters (Table 7.11), it is possible to identify the meta-prototypical coda for Beethoven's symphonic first and final sonata-allegro and sonata-rondo movements. In addition to identifying B/5/4 as the most conformant and B/4/4 as the least-conformant coda, Section 7.5 identified that:

- Although a trendline suggests that Beethoven's codas *become more conformant with the prototype* over time, the SRCT does not identify this trend as significant. It is possible that, although Beethoven experimented with the coda in his symphonies, he experimented with a pre-established structural section rather than (as in the case of Haydn and Mozart) its initial development and establishment. This hypothesis is supported by the lack of SRCT correlations between the parameters and time, and the variance in the structural proportions of Beethoven's first and final movements.
- The percentage of movements fewer than 50 percentage-points from the prototype is higher in Beethoven's first movements than his final movements.

- Two of the three most-conformant codas (B/2/4 and B/5/4) and two of the three least-conformant codas (B/1/4 and B/4/4) can all be found in the final movements. Not only do the final-movement codas provide a good template for a prototypical coda, they also, paradoxically, contain Beethoven's most experimental codas.

Although the correlation data presented in Section 7.6 (p. 345) suggest that, over time, the proportion of supertonic harmony decreases, the proportion of CM decreases, and the orchestration gradient decreases, the general lack of identifiable correlations suggests that Beethoven's codas, with regard to the parameters investigated, do not change statistically over time.

With the prototype established for the coda in the first and final movements of Beethoven's symphonies, Chapter Eight will cross-reference the observations of Chapters Five, Six and Seven, identify the similarities and differences between the organisation of the coda in Haydn's, Mozart's and Beethoven's symphonic first and final movements, and provide a generalised definition for the sample codas.

Chapter Eight – Conclusion

8.1 Introduction

This thesis has set out empirically to identify and explore the organisation and function of the coda in the first and final symphonic sonata-form movements by Haydn, Mozart and Beethoven. The study has also provided a new methodology which, with minor alteration, could be applied to the coda, and other structural sections, in other forms, genres, periods, and composers. This new methodology and approach have been fundamental in formalising an understanding of the coda in the Haydn, Mozart and Beethoven samples. Theorists who have studied musical form have tended to do rather poorly by their investigation and description of the coda. Whether this is as a result of:

- the chosen sample and its size,
- the terminology used to describe the coda,
- the hierarchical position of the coda within a larger form,
- the inability to identify the coda,

theoretical and analytical results regarding the coda are often vague and unreflective. This thesis has attempted to fill this gap in the literature by addressing the research question: *How is the coda organised and how does it relate to the movement as a whole?*

This final chapter reflects on the original empirical methodology and findings presented in this thesis. Section 8.2 summarises and cross-compares the main findings of Chapters Three, Four, Five, Six and Seven. In Section 8.3, the thesis' theoretical and methodological contributions are discussed, and a new definition of the coda is presented. Afterwards, the current limitations of the theories proposed and the statistical methodology created are examined (Section 8.4). Section 8.5 provides an overview of the possible future research this study promotes. The overall success of this research project is examined in Section 8.6. Section 8.7 provides some final thoughts.

8.2 Summary of Findings

The core research question of this study is: *How is the coda organised and how does it relate to the movement as a whole?* In order to engage with this research question, a statistical methodology, which allowed for the examination of every coda in the sample, has been employed. The main research question can be divided into a number of related sub-questions, which involve:

1. the development of a method of coda-identification (Section 8.2.1);
2. a study of the methods of closure employed, historically, before the introduction of the coda in symphonic first and final sonata-form movements (Section 8.2.2);
3. the investigation of the different types of recapitulation-coda parataxis (Section 8.2.3);
4. an analysis and study of how Haydn, Mozart and Beethoven treat the coda in certain works over time (Section 8.2.4).

The thesis set out to respond to each of these questions. The following sub-sections summarise the findings that address these sub-questions.

8.2.1 How does one identify whether or not a movement contains a coda and where that coda begins?

Chapter Three proposed a methodology for identifying both the presence and the starting bar of the coda in sonata-form movements. This methodology comprises eight criteria (Table 3.1), based on a number of musical elements including structural breaks, melodic material, harmonic material, breaks in rhythmic continuity and texture. These criteria, when applied to a sonata-form movement, identify a starting bar for the coda based on a majority consensus. On average, across all three sample composers, 2.7 of the criteria are used to identify the starting point of the coda.

Interestingly, as the research around criterion one – *the coda clearly begins after the development-recapitulation double repeat bar and/or is identified by the use of the word 'Coda'* – proves, all three sample composers were familiar with writing the term 'coda' in their scores. However, based on the low application rates for this criterion, it is clear that its application as a method of coda identification is unreliable. Although criterion two – *'the start of the coda is best located at the moment when the music of the recapitulation no longer corresponds to that of the exposition, even if that moment is not perceived as a structural beginning'* (Caplin, 1998, p. 181) – has, in previous studies of the coda, been regarded as the most efficient method of identifying the starting point of the coda, the data collected in Chapter Three would suggest that criterion six – *'the start of the coda is unambiguous: the recapitulation is clearly over, rhythmic continuity is broken… and a new initiating unit begins the coda'* (Caplin, 1998, p. 181) – is equally relevant in identifying the start of the coda, if not a slightly more accurate indicator. Of the whole sample, 85% of the codas can be identified using criterion six, two percentage-points more than criterion two (83%).

Not only did Chapter Three identify criterion six as the most successful for the identification of the starting point of the coda, but further study of this criterion allowed for the creation of a definitive list of devices used to create a break in rhythmic continuity. These devices include, in isolation and in combination, silences, cadences and pauses. Of these devices, silence features most often.

Finally, by plotting the criteria data across time, Chapter Three identified changing trends in the applicability of the criteria over time. Most noticeable of the trends identified by Figures 3.26, 3.27 and 3.28, is the increase in the applicability of criteria six and seven, and the decrease in the applicability of criterion two, as indicators of the start of the coda in

Haydn's and Mozart's symphonies. As stated in Section 3.3 (p. 146), these trends could suggest, with regard to criteria six and seven, that the coda became more established, longer and more complex, requiring greater foregrounding as an independent section for the listener. Criteria six and seven could be easily used to communicate the end of the recapitulation and the beginning of the coda, and thus establish the addition of the coda to the standard form. As discussed in Section 2.1.4 (p. 66), by the end of the eighteenth century, the concept of the coda was becoming widely recognised. It could be speculated that the clarity of the divide between the recapitulation and the coda, through the break in rhythmic continuity and change in texture, encouraged late composers to understand the coda as a self-contained section. Unfortunately, without expanding the study to incorporate a larger sample of works, and without exploring the psychological impacts of secondary parameters on the listener, this can only be theorised at this stage.

8.2.2 How was closure achieved, historically, before the introduction of a coda in symphonic first and final sonata-form movements?

Through analysing all 333 movements included in the sample, regardless of whether or not they include a coda, Chapter Four was able to establish three methods of movement closure and one method of closure through transition: CO1, CO2, CO3 (Coda) and CTT. CO1 (Section 4.2.1, p. 157), the most dominant method of closure used by Haydn and Mozart pre-1770 and prior to the regular use of the coda, achieves closure through the repetition of the ECM (Section 2.4.3, p. 76) at the end of the recapitulation. CO2 (Section 4.2.2, p. 162), although concluding a movement with additional material, is a separate method of closure to the coda, owing to its length, number of criteria used to identify it, and its inability to stand independently from the recapitulation. CO2 is an expansion or extension of the final bars of the movement, constructed using emphatic chords and cadential gestures. CTT (Section 4.2.3, p. 170), is present in five of the first movements from the Mozart sample and its presence could be a product of the ‘Italian’ overture-symphony influence. CTT does not function primarily to create closure; rather, it acts as a *transition*, linking one movement to the next.

The data in Figures 4.10, 4.11, 4.12 and 4.13, highlight the changing trend of the identified closing operations across Haydn’s and Mozart’s symphonies. They show a progression from movements containing CO1 through to a coda. This movement from CO1 to a coda occurs around 1772. For Mozart, this change is clearly evident. For Haydn, however, there is a more gradual progression between the two closing operations. As Section 4.2.5 (p. 174) highlights, these data could suggest that Haydn experimented more with concepts of closure and that the codas prior to 1772 are products of this experimentation. By the Beethoven sample, all the sonata-form movements are concluded with a coda (CO3). Section 4.2.5 also speculates that during and post-Beethoven, the coda may no longer be developing externally (as an experimental, optional passage), but instead developing internally. Evidence in support of this can be found in the increased length of Beethoven’s codas.

8.2.3 What are the different types of recapitulation-coda parataxis?

In addition to discussing how closure was achieved, historically, before the introduction of the coda in the sample, Section 4.3 (p. 184) explored the different methods of integrating the end of the recapitulation and the beginning of the coda. The three methods identified are labelled as ‘defined’ – a clear break between the recapitulation and coda – ‘continuous’ – an organic transition between the recapitulation and coda – and ‘elided’ – the recapitulation forms the beginning of the coda. Classification of the coda is determined by the position of the starting bars of the coda, identified by criteria two, six and seven (p. 100, 115, and 125, respectively), in relation to one another. The coda-identification methodology is essential in establishing the recapitulation-coda parataxes.

Perhaps, given the high applicability rate of criterion six in identifying the starting point of the coda, followed closely by criterion two, it is not surprising that the ‘defined’ coda is the most prominent in the sample, closely followed by the ‘continuous’ coda. The high proportion of ‘defined’ codas could support the hypothesis presented in Section 8.2.1 (p. 352), namely that the sample composers made efforts to communicate clearly the beginning of the coda to their listeners.

With regard to the composer specific proportions of ‘defined’ and ‘continuous’ coda, there is a larger proportion of ‘defined’ coda than ‘continuous’ coda in the Haydn and Mozart samples: 51% for Haydn and 56% for Mozart (19 and 34 percentage-points more than the ‘continuous’ codas, respectively). In comparison, there is an almost equal proportion of ‘defined’ and ‘continuous’ coda in Beethoven’s sample: 50% ‘defined’ coda and 44% ‘continuous’ coda (the percentage-point difference is equivalent to one movement). These statistics could reflect the passage of time between Haydn and Mozart, and Beethoven. Further research could investigate whether or not this stylistic distinction is present in movements by other composers of the eighteenth and nineteenth centuries.

8.2.4 How do Haydn, Mozart and Beethoven treat the coda differently in their works and how does it change over time?

Chapters Five, Six and Seven engaged with the codas in the sample of movements by Haydn, Mozart and Beethoven, respectively. These chapters calculated the prototype for each of the parameters investigated, subsequently identifying a hypothetical prototype coda. The average data for the first- and final-movement codas were then individually compared against the prototype to identify any differences between the organisation of the coda in the first and the final movements. With this complete, and given that the hypothetical prototype coda will not exist, the most- and least-prototypical codas were identified and discussed with relation to the prototype. If a significant difference between the first- and final-movement codas is identified (e.g., the structural proportions of Beethoven’s codas (Section 7.3.1, p. 309)), the most- and least-prototypical codas are identified and discussed with relation to the movement specific prototype. In the penultimate section of Chapters Five, Six and Seven the relationship between the parameters and time was investigated. The following subsections summarise and compare the findings for the three composers.

Prototype Data

The prototype data provide an average value for each of the parameters investigated. Sections 5.2 (p. 206), 6.2 (p. 253) and 7.2 (p. 303) identify a hypothetical prototype coda for Haydn, Mozart and Beethoven, respectively. Table 8.1 summaries the data presented in these sections. The final column of Table 8.1 calculates the numerical mean average for all three samples combined. This column is used to create the new definition of the coda in Section 8.3.1. Any parameters which are equal to, or greater than five percentage-points from either the three-composer average, or the other two samples, are identified as significantly different and highlighted in red.

Table 8.1 – Summary and comparison of the three composer coda prototypes.

<table>
<tr><th colspan="2">Parameter</th><th colspan="2">Haydn</th><th colspan="2">Mozart</th><th colspan="2">Beethoven</th><th colspan="2">Three- Composer Mean Average</th></tr>
<tr><td colspan="10"><u>Structure</u></td></tr>
<tr><td colspan="2">Number of Criteria used for Coda Identification</td><td colspan="2">3</td><td colspan="2">3</td><td colspan="2">3</td><td colspan="2">3</td></tr>
<tr><td colspan="2">Raw Length of the Coda</td><td colspan="2">31</td><td colspan="2">28</td><td colspan="2">103</td><td colspan="2">54</td></tr>
<tr><td rowspan="5">Proportion (%)</td><td>Length of the Coda with/without Introduction</td><td>11</td><td>13</td><td>6</td><td>9</td><td>11</td><td>24</td><td>9</td><td>15</td></tr>
<tr><td>Length of the Introduction</td><td colspan="2">5</td><td colspan="2">5</td><td colspan="2">6</td><td colspan="2">5</td></tr>
<tr><td>Length of the Exposition with/without Introduction</td><td>40</td><td>39</td><td>44</td><td>38</td><td>45</td><td>35</td><td>43</td><td>37</td></tr>
<tr><td>Length of the Development with/without Introduction</td><td>25</td><td>24</td><td>15</td><td>18</td><td>19</td><td>20</td><td>20</td><td>21</td></tr>
<tr><td>Length of the Recapitulation with/without Introduction</td><td>19</td><td>24</td><td>29</td><td>34</td><td>19</td><td>21</td><td>22</td><td>26</td></tr>
<tr><td colspan="10"><u>Harmony</u></td></tr>
<tr><td colspan="2">Chord Diversity</td><td colspan="2">7</td><td colspan="2">6</td><td colspan="2">9</td><td colspan="2">7</td></tr>
<tr><td colspan="2">Harmonic Rhythm</td><td colspan="2">1.46</td><td colspan="2">1.35</td><td colspan="2">0.76</td><td colspan="2">1.19</td></tr>
<tr><td rowspan="8">Proportion (%)</td><td>Tonic Harmony</td><td colspan="2">46</td><td colspan="2">57</td><td colspan="2">42</td><td colspan="2">48</td></tr>
<tr><td>Supertonic Harmony</td><td colspan="2">6</td><td colspan="2">7</td><td colspan="2">4</td><td colspan="2">6</td></tr>
<tr><td>Subdominant Harmony</td><td colspan="2">8</td><td colspan="2">6</td><td colspan="2">7</td><td colspan="2">7</td></tr>
<tr><td>Dominant Harmony</td><td colspan="2">26</td><td colspan="2">19</td><td colspan="2">26</td><td colspan="2">24</td></tr>
<tr><td>Submediant Harmony</td><td colspan="2">3</td><td colspan="2">4</td><td colspan="2">3</td><td colspan="2">3</td></tr>
<tr><td>Secondary-Dominant Harmony</td><td colspan="2">5</td><td colspan="2">2</td><td colspan="2">7</td><td colspan="2">5</td></tr>
<tr><td>Diminished-Seventh Harmony</td><td colspan="2">3</td><td colspan="2">2</td><td colspan="2">5</td><td colspan="2">3</td></tr>
<tr><td>Silence</td><td colspan="2">1</td><td colspan="2">1</td><td colspan="2">1</td><td colspan="2">1</td></tr>
</table>

Thematic Material					
Thematic Material Diversity		4	3.5	5	*4*
Proportion (%)	Repetition	6	13	6	*8*
	IM	1	1	0	*1*
	EFS	32	32	41	*35*
	ETM	2	2	5	*3*
	ESS	5	3	7	*5*
	ECM	17	21	9	*17*
	DM	2	10	6	*6*
	CM	27	14	17	*19*
	TM	11	16	10	*12*
	LP	2	2	2	*2*
	DMM	1	0	0	*0*
Instrumentation and Orchestration					
Total Percentage Orchestration (%)		77	81	78	*79*
Orchestration Gradient		0.014	0.014	0.004	*0.011*
Proportion (%)	Woodwind	73	77	78	*75*
	Flute	72	74	77	*74*
	Oboe	72	75	76	*74*
	Clarinet	70	76	74	*72*
	Bassoon	76	85	83	*81*
	Brass	62	68	65	*65*
	Horn	65	73	73	*70*
	Trumpet	59	62	57	*59*
	Timpano	57	60	58	*58*
	Strings	90	91	87	*89*
	First Violin	94	97	90	*94*
	Second Violin	93	97	89	*93*
	Viola	89	91	87	*89*
	Cello	86	85	87	*86*
	Double Bass	86	85	83	*85*

What is most notable about the data in Table 8.1 is the lack of differences between the three samples with regard to the parameters investigated. Of the few differences that are identified, the largest number can be found with regard to the structural proportions of the movement. Although the proportional length of the exposition remains similar across the sample, in both movements with and without an introduction, there are significant differences identified between the proportional lengths of the development, recapitulation and coda in the three samples. Mozart's development and coda sections, on average, are smaller than those of Haydn and Beethoven, balanced by a significantly larger recapitulation. Interestingly, if the length of the coda is an indicator for inclusion as a standard section of sonata-form, the prototype data for Beethoven (specifically, for movements without an introduction) are evidence alone to suggest that the coda should be labelled as a fourth division, rather than as an 'optional section' (Caplin, 1998, p. 179). This is because the coda is, on average, proportionally larger than the development and the recapitulation section, separately.

With eight sub-parameters highlighted, Mozart's codas are possibly the most variable in their organisation. However, this is not necessarily owing to their complexity, but, as discussed in Section 6.5 (p. 291), their simplicity. Mozart's codas, especially his earlier codas (e.g., M/161/3), in comparison with Haydn's and Beethoven's codas, are shorter, comprising larger proportions of tonic harmony and TM, and with larger quantities of repetition.

For Haydn and Beethoven, the most significant differences appear to be evident in their use of thematic material. Haydn's codas contain, on average, the largest proportion of CM, whilst Beethoven's codas contain, on average, a proportionally larger amount of EFS and a proportionally smaller amount of ECM. This could suggest that although Haydn and Mozart place emphasis on creating emphatic periods of closure at the end of their codas through the use of CM and TM, Beethoven, while still creating the feeling of completion in the same manner, focuses the coda on restating and outlining the EFS. This hypothesis is supported by the reduced proportion of the recapitulation in Beethoven's movements. Given that the recapitulation section is proportionally smaller than the exposition (the exposition, on average, is proportional to 40% of the movement, whilst the recapitulation is proportional to 20%), the coda must, in part, adopt the role of the recapitulation. In addition, the smaller proportion of ECM could be explained, in contrast to the discussion of ECM in Mozart's codas (Section 6.6.3, p. 289), by the limited number of Elided codas present in the Beethoven sample.

First- and Final-Movement Codas

In Chapter Four the question 'Do composers construct the coda differently depending on the movement to which it is attached?' (p. 156) was asked. Sections 5.3 (p. 211), 6.3 (p. 258) and 7.3 (p. 308) investigated the organisation of the coda in the first and final movements. Overall, the results of these analyses suggest that the organisation of the coda does not differ significantly between the first and final movements. However, a number of minor exceptions do exist. A summary of these findings can be found in Table 8.2. Only the parameters which contain a significant difference are re-presented.

Table 8.2 – Summary and comparison of the organisation of the coda in first and final movements.

Parameter	Haydn	Mozart	Beethoven
Structure			
Proportional Length of the Coda			✓
Harmony			
Harmonic Rhythm	✓		
Proportion of Tonic Harmony			✓
Thematic Material			
Proportion of EFS		✓	
Proportion of ETM			✓
Proportion of ECM	✓		
Proportion of CM	✓		
Instrumentation and Orchestration			
Proportion of Clarinet		✓	✓
Proportion of Trumpet	✓	✓	✓
Proportion of Timpano			✓

✓ = Significant difference between the first and final movement

Across all the parameters studied, only 21% of the sub-parameters investigated identify a difference between the coda in a first movement and that in a final movement. Furthermore, with the exception of the clarinet and trumpet, which appear to be treated differently in the codas from the first and final movements by two or more composers (Sections 5.3.4, p. 218, 6.3.4, p. 264, and 7.3.4, p. 314), the differences are restricted to an individual composer. It could therefore be speculated that these differences are composer-specific choices, rather than generalisations of the coda. Further research, expanding the sample, would be required to support or reject this hypothesis. Based on the summary information in Table 8.2, the coda is organised in a similar format, regardless of the movement of which it is a part.

In addition to the differences between the codas in the first and final movements, there appears to be only one significant difference, identified by the statistical methodology, between sonata-allegro and sonata-rondo codas in finale movements. This difference is found in the structural proportions of the sonata-rondo codas. Sonata-rondo movements tend to contain longer codas than sonata-allegro movements. This is most apparent in the Beethoven sample. The three sonata-rondo movements in the Beethoven sample (B/2/4, B/6/5 and B/8/4) contain proportionally longer codas than the rest of the Beethoven sample. Unfortunately, given the sample size of sonata-rondo movements in the Beethoven sample, it is not possible to identify whether this observation is a product of chance or compositional choice. It is also possible that further differences do exist between the codas in these two formal types, but that these differences have not been captured by the methodology applied in this study. Further research on sonata-rondo codas in different genres may provide greater insight into these questions.

Parameter Prototype Codas

Sections 5.4 (p. 220), 6.4 (p. 267) and 7.4 (p. 316) compared the sample of codas against the identified sub-parameter prototypes (e.g., the most-conformant coda with regard to the proportion of ECM in the coda), identifying the most- and least-conformant examples. Sections 5.5 (p. 243), 6.5 (p. 291) and 7.5 (p. 340) identified the most- and least-conformant coda for each of the four parameters and for the composer sample overall. These findings are restated in Table 8.3, followed by a brief comparison of the three meta-prototypical codas. To compare each prototypical-parameter coda is beyond the scope of this chapter and would result in the re-statement of descriptions and analyses found in Chapters Five, Six and Seven.

Table 8.3 – Parameter-Prototypical and Meta-Prototypical Codas.

Parameter	Most-Conformant Coda	Least-Conformant Coda
Haydn		
Meta-Prototypical Coda	**H/95/4**	
Structure	H/95/4	H/90/4
Harmony	H/95/1	H/23/4
Thematic Material	H/83/4	H/86/1
Instrumentation/Orchestration	H/83/4	H/54/1
Mozart		
Meta-Prototypical Coda	**M/338/3**	
Structure	M/338/3	M/297/1
Harmony	M/338/1	M/202/4
Thematic Material	M/338/3	M/550/4
Instrumentation/Orchestration	M/121/3	M/200/1
Beethoven		
Meta-Prototypical Coda	**B/5/4**	
Structure	B/2/1	B/8/4
Harmony	B/6/1	B/4/1
Thematic Material	B/2/4	B/5/4
Instrumentation/Orchestration	B/8/4	B/4/4

Structural Proportions of the Meta-Prototypical Codas

Although the three most-conformant codas (H/95/4, M/338/3 and B/5/4) were composed over a 28-year period, they contain a number of similarities. M/338/3, dated *c.*1780, contains a coda with a raw length of 28 bars, proportional to 9% of the movement. The exposition, development and recapitulation are proportional to 44%, 14% and 32% of the movement, respectively. Most notably, the coda from M/338/3 contains 41% tonic harmony, 23% dominant harmony and an increased proportion of diminished-seventh chords in comparison with the prototype. The chord diversity equals eight and the harmonic rhythm is 0.82 chords per bar. Thematically, the coda is constructed of EFS, ECM, DM, CM and TM, with the largest proportions found in the EFS and ECM. The total percentage orchestration equals 85% (i.e., on average, 85% of the instruments are sounding at one time).

H/95/4, dated *c.*1791, contains similar structural proportions to M/338/3. The coda is 31 bars in length, only three bars longer than M/338/3. Although the coda is proportional to 13% of the movement (four percentage-points larger than M/338/3), all the structural proportions are, with regard to M/338/3, within the significance criterion (+/- five percentage-points) applied in Sections 5.3 (p. 211), 6.3 (p. 258) and 7.3 (p. 308): the exposition, development and recapitulation are proportional to 45%, 11% and 31% of the movement, respectively.

The structural proportions of B/5/4 show the first difference between the most-conformant codas, with a significant difference recorded for every sub-parameter, and the recapitulation being the proportionally smallest section. As previously shown in Table 8.1, the significant differences between the structural proportions of Haydn's and Mozart's most-conformant codas and the structural proportions of Beethoven's most-conformant coda are to be expected. Beethoven's codas are, on average, longer than those of Haydn and Mozart, and the codas from Beethoven's final movements are proportionally larger. With regard to the structural proportions alone, B/2/1, not B/5/4, contains the most-conformant coda. This coda aligns more closely with those from H/95/4 and M/338/3. The coda is 57 bars in length, proportional to 12% of the movement.

Harmonic Organisation of the Meta-Prototypical Codas

With regard to the harmonic organisation of the three most-conformant codas, although the percentages of the different harmonies vary, the ratio remains almost constant. For all three composers, the proportion of tonic harmony is the largest, ranging from 41% to 50%. The proportion of dominant harmony is the second largest, again with the percentages located between 23% and 29%. The most significant variances are located in the proportions of supertonic, subdominant and diminished-seventh harmony. Although the percentages of supertonic and diminished-seventh harmony are similar for the most-conformant codas by Haydn and Beethoven, the proportions are higher in Mozart's coda. Similarly, although the percentages of subdominant harmony and the values for harmonic rhythm are similar for the most-conformant codas by Mozart and Beethoven, the proportions of subdominant harmony and rate of harmonic change are higher in Haydn's coda. Once again, the meta-prototypical codas are not the most-conformant with regard to the harmonic parameter in isolation. The examples identified in the codas by Haydn and Mozart are not present in the prototype data (Table 8.1) and the relevant most-conformant codas (H/95/1 and M/338/1).

Thematic Organisation of the Meta-Prototypical Codas

Thematically, there is a larger deviation between the three meta-prototypical codas than there is in the harmonic organisation, especially with regard to B/5/4. This is primarily because B/5/4 is identified as the least-conformant coda with regard to the thematic parameter. As with the harmonic data, the prototype data and most thematically conformant codas are similar in organisation, and a number of similarities also exist between the three meta-prototypical codas. The first is that all three conform to the relative thematic templates discussed in detail in Sections 5.4.3 (p. 231), 6.4.3 (p. 278), and 7.4.3 (p. 327). They include the following thematic progression, or slight variation, of: ECM–EFS–CM–TM. The second is that all three codas contain and conclude with large proportions of CM and TM. The most significant differences between these three movements exist in the proportions of thematic materials and the presence of additional passages beyond the template. Both the codas from H/95/4 and M/338/3 contain EFS proportional to 29% of the coda. However, in contrast, B/5/4 contains only 7%. All three codas contain CM and TM, but again the proportions vary across the three meta-prototypical codas. H/95/4 contains CM and TM, which when combined are proportional to 71% of the coda, whilst percentages for M/338/3 and B/5/4 are 28% and 50%, respectively. The percentage difference between H/95/4, verses M/338/3 and B/5/4, is accounted for by the additional material present in the codas. That in H/95/4 consists of EFS, CM and TM, whereas M/338/3 and B/5/4 contain EFS (M+B), ETM (B), ESS (B), ECM (M), DM (M), DMM (B), CM (M+B), and TM (M+B). What this shows is that, even in a comparison which includes one of the least-conformant codas in the sample, there are similarities to identify and generalisations to make, and that the coda still aligns with the templates discussed in this thesis.

Instrumentation and Orchestration of the Meta-Prototypical Codas

The orchestration and instrumentation parameter shows many close similarities between the meta-prototypical codas, even though none of them is identified as the prototypical-parameter coda. The total orchestration percentage for all three meta-prototypical codas is found between 80% and 85%, whilst the proportional use of the woodwind, brass and string sections varies from 80–90%, 66–68%, and 88–98%, respectively. The largest difference between the instrumentation of the three meta-prototypical codas is found in the use of the timpani. The smallest proportion is found in M/338/3 (50%), whilst the largest proportion is found in B/5/4 (73%). Although these values are dissimilar, the prototype value for the timpani in Haydn's, Mozart's and Beethoven's codas ranges from 57% to 60%. This would suggest that, on average, the timpani is used in a similar deployment and that the meta-prototypical codas are not representative examples of this deployment.

What the meta-prototypical codas and their cross-comparison highlight are the similarities between the organisation of the coda by these three composers and the importance of identifying prototypical-parameter codas. It is also worth noting that each of the prototypical codas for Haydn, Mozart and Beethoven is calculated autonomously – each sample is uninfluenced by the other two samples. It is perhaps easy to draw comparisons between the hypothetical prototypes, but it is important to see these observations reflected in the movements from which the data has been extrapolated. The similarities between the meta-prototypical codas reinforce a view that the organisation of the coda, by these three composers, although containing differences and some anomalous examples, is perhaps more similar than has previously been understood.

Changing Trends over Time

Sections 5.6 (p. 246), 6.6 (p. 295) and 7.6 (p. 345) analyse the changes in the use of individual parameters across time in Haydn, Mozart and Beethoven, respectively. Overall, the results of these analyses suggest that the organisation of the coda, in each sample, does not significantly change over time. However, as with the investigation into the differences between first- and final-movement codas, a number of minor exceptions do exist. A summary and comparison of these findings can be found in Table 8.4. Parameters which do not contain any significant trends are omitted.

Table 8.4 – Summary and comparison of significant parameter changes over time.

Parameter (vs. time)	Haydn	Mozart	Beethoven
Structure			
Raw Length	+	+	
Harmony			
Chord Diversity	+	+	
Harmonic Rhythm		+	
Proportion of Tonic Harmony	−	−	
Proportion of Supertonic Harmony			−
Thematic Material			
Thematic Material Diversity	+	+	
Proportion of ECM		+	
Proportion of CM			−
Proportion of TM		−	
Instrumentation and Orchestration			
Total Percentage Orchestration	−		
Orchestration Gradient			−
Proportion of First Violin			−

+ = A significant positive change over time recorded
− = A significant negative change over time recorded

Haydn and Mozart significantly increase the raw length of the coda, increase the level of chord diversity whilst reducing the proportion of tonic chord, and increase the diversity of thematic material in the coda, over time. In addition, there is also a significant change in the harmonic rhythm of Mozart's codas over time. Given the types of trends highlighted for the three composers, the results would support a hypothesis which views Haydn and Mozart as innovators and developers of the coda. However, without studying codas from composers beyond the thesis sample, this accolade cannot be bestowed solely on Haydn and Mozart. Although there are significant trends present in the Beethoven sample, these generally reflect more specific compositional elements (i.e., a reduction in the proportion of first violin). These data would therefore also support the hypothesis outlined in Section 4.2.5 (p. 174), which suggests, that at the time of Beethoven's symphonies, development of the coda plateaus. To reiterate the statement made in Section 7.5 (p. 340), this is not to suggest that Beethoven's codas follow a more standardised format than Haydn and Mozart. However, with a basic underlying format for the coda being established towards the end of Haydn's and Mozart's careers, Beethoven's symphonic first and final movements arguably contain more experimentation *within* a recognised structural section, rather than focusing on its development. In order to support or reject this hypothesis, the thesis sample would need to be expanded beyond its current boundaries.

8.3 Overall Contributions

It is hoped that this study contributes significantly to our knowledge of a section of sonata form which – although belonging to a much investigated form, utilized by three canonic composers, and being deployed in an instrumental genre deemed to be the most popular and important in the Classical era (Boyd, 1993, p. 1) – has been profoundly neglected in music literature. The thesis demonstrates that the combination of theoretical investigation and prototypical-statistical analysis is complementary and that they are necessary tools for gaining a fuller and more rounded understanding of form. The approaches in this thesis not only engage with the whole sample, but they also allow for the organisation of the coda to be discussed both as an autonomous entity and in terms of its relation to the larger form.

The eight coda-identification criteria provide a methodology for systematically identifying the presence and the start of the coda. Although the features which form some of these criteria are referenced in the literature on the coda, this is the first time, to my knowledge, that an attempt has been made to construct such a methodology. Studies no longer need to be restricted to the investigation of selected 'defined' codas (or what Cavett-Dunsby (1988, p. 31) describes as 'formal' codas), and the observations and conclusions made on the coda no longer need to be tainted by the samples used to create them. In addition to identifying the presence and the start of the coda, the criteria methodology has also enabled the thesis to contribute to our understanding of closure in sonata-form symphonic first and final movements preceding and during the emergence of the coda, and the ways in which the coda is connected to the end of the recapitulation.

The prototypical-statistical approach adopted in this thesis not only allows for a detailed insight into the organisation of the coda in terms of the parameters studied, but it also provides an approach which engages with every first and final movement in the sample. Again, as with the eight coda-identification criteria, this is the first time, to my knowledge, that a study of the coda has implemented such an approach. Although previous studies of the coda have included larger samples in their investigations than mine (e.g., Caplin, 1998), they do not engage with every coda in that sample (Section 1.2.2, p. 40). Furthermore, the prototypical-statistical approach assigns the same level of importance to every coda in the sample. This removes the disproportionate attention some codas have received owing to one or two anomalous parameters. B/8/4, for example, which features in Kerman's (1982) study on the coda, owing to its enlarged length, is not as irregular with regard to other parameters. The prototypical-statistical approach identifies B/8/4 as the most-conformant example in terms of the use of instrumentation and orchestration in Beethoven's symphonic first- and final-movement codas.

Perhaps the most significant indirect contribution of this thesis to the study of sonata form, beyond the coda in the symphonic first and final movements by Haydn, Mozart and Beethoven, is the applicability of the approaches adopted. The eight coda-identification criteria could, with minor alteration, be applied to sonata-form movements in other genres and by different composers. The prototypical-statistical methodology also has the potential to be applied to much larger samples as well as to the investigation of other structural sections (Section 8.5).

The approaches taken in this thesis have made it possible to identify a much closer level of similarity, on average and with regard to the parameters studied, between the sample codas of Haydn, Mozart and Beethoven than was previously thought to exist. Subsequently, this has led to the creation of parameter-specific generalisations and, as Section 8.3.1 demonstrates, a re-evaluated and more focused view of the organisation of the coda.

8.3.1 Definition of the Coda

The following section provides a reworked definition of the coda based on the modification of current understandings and the findings of this thesis. Given the latter, the statements presented are subject to revaluation once further research on the coda in other forms and genres and by other composers is undertaken. However, until such time, the definition presented here, which is divided into six parts, is current and meaningful.

1. Coda: the Italian word for 'tail', which comes from the Latin 'cauda'. An autonomous structural section identified by three criteria and found at the end of a movement. Replacing and developing previous methods of movement-closure (CO1: repeating the closing material from the exposition; and CO2: short extensions, less than eight bars,

involving emphatic chords and cadential gestures), the coda can be first found in works dating from the autumn of 1771 to early 1772. From this point until 1793, the coda is an optional, but by no means inessential, addition found at the end of sonata movements. However, it becomes a permanent feature in the last seven years of the eighteenth century, and in the nineteenth century. Codas are connected to the previous material of the movement by one of three methods:

- Defined (a clear break between the recapitulation and coda),
- Continuous (an organic transition between the recapitulation and coda),
- Elided (the recapitulation forms the beginning of the coda).

2. Although a number of parameters implicated in the organisation of the coda are sometimes altered (e.g., the proportion of tonic harmony), a number of parameters are treated differently by the three composers (e.g., the proportion of bassoon and horn), and a small number of parameters change over time (e.g., the raw length of the coda), it is possible to create a generalisation regarding the organisation of the coda. The final movements of H/95, M/338 and B/5 provide good examples of this coda definition.
3. Larger than eight bars, the coda is proportional to 12% of the movement. Movements with an introduction tend to contain proportionally smaller codas (nine percentage-points on average), whilst movements without an introduction tend to be proportionally larger (15 percentage-points on average). Movements which contain codas larger than the average are balanced with smaller exposition and/or recapitulation sections. This method of balance is dependent on the composer (e.g., Mozart’s larger codas are balanced by smaller recapitulations, whilst Beethoven’s larger codas are balanced by smaller expositions). Codas proportionally larger than 12% of the movement are more often found in symphonic final movements than in first movements.

4. Harmonically, a coda (based on the thesis sample) contains seven different chord types, with the harmonic rhythm slightly above one chord per bar (1.19). Codas contain a proportion of tonic harmony equivalent to 48% of the section. The remaining 52% of the coda is constructed of supertonic, subdominant, dominant, submediant, diminished-seventh and secondary-dominant harmonies. The shorter the absolute length of the coda, the larger the proportion of tonic chords, the smaller the proportion of subdominant and dominant chords, and the lower the chord diversity. Codas are harmonically more diverse at the beginning, resolving to dominant and tonic harmony towards their conclusion. This mirrors the organisation of thematic material in the coda, particularly the position of CM and TM.
5. The coda consists of four different types of thematic material, taken from the introduction, exposition and development. CM and TM can also be located in the coda. The most commonly occurring thematic sequence in the coda begins with ECM, followed by EFS, CM and TM. Material from the EFS comprises the largest proportion of the coda (35%), followed by CM (19%), ECM (16%) and TM (12%). The coda appears to adopt, in part, the role of the recapitulation, restating first-subject material and then creating closure through the use of emphatic chords and cadences. As the absolute length of the coda increases, so does the proportion of EFS and ECM, while the proportion of CM and TM decreases.
6. The instrumentation of the coda is naturally determined by the movement to which it is attached. The coda is heavily orchestrated, with the total percentage orchestration calculated at 79% (i.e., 79% of the instruments are sounding at one time). The level of orchestration remains relatively consistent throughout the coda, with only a slight increase towards the end. CM and TM are almost always orchestrated as *tutti*, whilst the

EFS, ETM, ESS, ECM and DM reflect its original orchestration or contain thinner and more diverse levels of orchestration. The coda concludes with a *tutti* orchestration.

8.4 Limitations of this Study

With any type of research there are limitations. Although researchers aim to reduce them, their implications still affect the conclusions and results of a study. The following section highlights the limitations of the research presented in this thesis.

8.4.1 The Sample

As discussed in Section 1.4.2 (p. 49), any attempt to describe and detail the coda in the entire history of Western Classical music would involve examining enormous quantities of music, and a study of the coda in multiple genres would be impossibly long and clearly beyond the scope of an investigation. Research which draws data from a wide range of genres, periods and composers is undoubtedly limited by the material it can effectively engage with. However, as Section 8.5 highlights, future research on the coda can adopt the methodologies presented here whilst exploring a different sample. A further complication in a study such as this, which aims to identify significant changes over time, is the issue of establishing accurate chronological placement of the works in the sample. Inevitably, many forms of research which study the chronological development of music of this period will struggle with this limitation. All one can do is to engage with the best available data and be aware that future research may contradict the results of any previous studies.

8.4.2 Organisation and Expressive Purpose of the Coda

It could be argued that this study focuses heavily on the organisation of the coda and does not explore in detail the consequences of this organisation on the overall design of the movement or the psychological effects of the coda on the listener. This is not to deny these as important or potentially very interesting areas of research. However, given the lack of consensus on the coda in literature on sonata form, it is important that a strong foundation regarding the organisation of the coda is created. One cannot hope to understand the relevance of the coda in these areas without, firstly, being able to identify the section and, secondly, generating a comprehensive understanding of the coda as an autonomous entity. The focus of this study is as much a necessity as it is an interesting area of research.

8.4.3 Subjective and Objective Research

Statistical methodologies allow for an abstract view of the music under study by reducing it to numerical representations and processing them through statistics. Although this allows for an objective approach to research, reducing issues such as confirmation bias (where scholars favour information that confirms, and disregard data that disproves, their beliefs or theories), it must be remembered that the objective findings are often derived from subjective processes. In this thesis, the prototypical-statistical methodology and SRCT are systematically treated. However, the extraction of the absolute data is a result of a number of subjective processes. These include:

- the creation of coda-identifying criteria,
- the parameters chosen for investigation,
- the analyses of the codas in the sample.

Although this subjective foundation perhaps raises concerns regarding the effectiveness of this approach (e.g., if the extraction of the absolute data is completed inaccurately, the objective findings will also be incorrect, regardless of their autonomous nature), without these methodologies it would not be possible to construct the definition presented in Section 8.3.1 (p. 371). Numerical approaches have the ability to identify patterns and essential features in large amounts of collected data which cannot necessarily be identified using descriptive-taxonomic approaches.

8.5 Future Research

The research undertaken in this thesis motivates further questions and application of the approach and results gathered to other research. To borrow one of Leichtentritt's concluding statements,

> though every single chapter is intended to be a coherent and logical unit, yet the sum of all the chapters must necessarily, in a [study] of this type, be incomplete. The story to be told has no real end; it might be extended to double or more of its length had the author thought it advisable to interpret still more works of the immense literature of music (1967, p. 451).

The following list outlines only some of the possible future applications of this research and areas of further study:

- *Expansion of the coda sample beyond that of sonata-form symphonic first- and final-movement codas by Haydn, Mozart and Beethoven.* As stated in Section 8.3 (p. 369), the methodologies employed here could be applied to the study of the coda in symphonic second and third movements, in different genres, and by different composers. Expanding the sample allows for the creation of numerous research questions. These include:
    - Is there a relationship between the period of composition, form and/or composer, and the criteria used for the identification of the coda?
    - Are the prototypes identified in this thesis transferable to other codas in different genres and movements by Haydn, Mozart and Beethoven?
    - Are the prototypes identified in this thesis transferable to other codas in genres and movements by different composers?

    - Given the importance of the symphony in the Classical period, is the largest quantity of codas found in this genre?
    - Is there a relationship between the date of composition and/or composer, and the identified methods of recapitulation-coda parataxis?
    - Section 8.2.4 (p. 356) hypothesises that Haydn and Mozart could be major innovators and developers of the coda. Is this correct, or are there examples of similarly organised codas found in works pre-1772 by other composers?

  Not only can the new samples be explored in isolation, they can continue to build on the foundations established in this thesis. Adding new data to that amalgamated in this thesis would provide further insight into the organisation and function of the coda. Observations and conclusions from further studies may result in the reinforcement of the generalisations made here regarding the coda based on the works of Haydn, Mozart and Beethoven, or conflict with the conclusions presented.

- *Work-specific analyses of the movements identified as the most and least conformant with regard to the coda in the thesis sample.* Although Section 8.4 (p. 374) emphasises the focus this thesis takes on creating generalisations, the next stage of research would involve work-specific case studies. These would focus on a selection of similar codas and the movements from which they are taken. They might explore why the selected codas are organised in the format identified in this thesis and the expressive effects of this organisation.
- *Application of the prototypical-statistical methodology to other structural sections in musical form.* Not only is the prototypical-statistical methodology applicable to codas beyond the sample investigated in this thesis, it is also applicable to structural sections other than the coda, both in sonata-form and other forms. Although the coda has clearly suffered neglect in sonata form studies, Riley suggests that neglect can also be

found in our understanding of the development and recapitulation sections (2015, p. 1). Applied in the same format as the study of the coda in this thesis, the prototypical-statistical approach would not only provide a method by which to compare developments and recapitulations, therefore identifying the most- and least-conformant examples, but if simultaneously applied to all sections of sonata form, it may also allow for a better understanding of how the coda relates to the movement to which it belongs. If this methodology were applied to all sections of sonata form, it would result in the creation, based on the parameters studied, of a sonata-form prototype. A comparison of this prototype with pre-established definitions would no doubt prove to be a very interesting and illuminating research project.

- *Expansion of the prototypical-statistical methodology to investigate a larger number of coda parameters.* This thesis engages with a relevant and scope-applicable range of parameters (structural proportions, harmony, thematic material, orchestration and instrumentation) and sub-parameters (absolute length of the coda, rate of harmonic rhythm, proportion of ECM, total percentage orchestration, etc.). However, it is possible to expand this number of parameters in future research. This expansion could involve:
    - investigating the pitch and rhythmic profiles of the melodies in the coda,
    - investigating the texture of the coda, identifying passages of monophony, homophony and polyphony, etc., and identifying the roles of the instrumentation in these textures,
    - a closer inspection of the thematic material and how, when applicable, it is varied or expanded from the original presentation.

As stated in Section 8.4 (p. 374), the parameter-specific and meta-prototypical codas identified are reliant on the data collected and how it is processed. Expanding the number of parameters under investigation should not directly affect the codas identified as the most and least conformant for the individual parameters (e.g., studying the rhythmic profile of the coda's melodies should not affect the prototypical results for the structural proportions). However, the expansion could affect the conclusions regarding the meta-prototypical codas.

- *Exploration of the development and emergence of the coda prior to 1772.* The transition from CO1 and CO2 to the coda prior to 1772 presents another interesting area of future research. Section 4.2.5 (p. 174) suggests, and Section 8.2.2 (p. 354) reiterates, that Haydn may have experimented more than Mozart with concepts of closure before 1772. This hypothesis is based on the assumption that the sample codas are dated accurately. Focused study of Haydn's 14 codas dated pre-1772 (p. 175), may provide an insight into the development of the section and its evolution from CO1 and CO2. The presence of the 14 pre-1772 codas and the overlap with CO1 and CO2 in the Haydn sample could suggest Haydn had more involvement in the development of the coda than Mozart. In comparison with Haydn, there is a clearer chronological divide between the use of CO1 and the coda in the Mozart sample which could suggest that around 1772 Mozart began implementing an already established modification to sonata form rather than experimenting with it alongside CO1 and CO2. Unfortunately, addressing this hypothesis is restricted by the size of the thesis sample. Mozart may have experimented to a greater extent with the coda than Haydn in a different genre or form prior to 1772.
- *Use of the thesis data to create stylistic compositions or possible realisations of incomplete movements and to critique those previously completed.* Applied with further statistical testing (e.g., regression analysis), the data collected in this thesis, and the prototypical-statistical methodology applied to other structural sections in a move-

ment, would provide a solid template for undertaking stylistic compositions or realisations of incomplete movements (e.g., the first movement of Beethoven's Symphony no. 10). The prototypical data identifies the constraints within which the composition should be located, whilst regression analysis uses the prototype data to predict the organisation of the section or movement.

Not only could the data provide templates for completion, but they could also be used to critique completed realisations. By analysing the realisation in the same format as the sample in this thesis, it would be possible to compare a realisation against the prototypical data, identifying how conformant they are against the prototype and whether or not they fall within the identified constraints. Cooper's (1988) realisation of Beethoven's Symphony no. 10 generated a significant amount of controversy, notably between Cooper and Winter, when it was published (Winter, 1991, pp. 96–116; Cooper, 1992, pp. 324–330). Although it is not possible to know how Beethoven's Symphony no. 10 would have sounded, it is possible to critique Cooper's realisation using the prototypical-statistical methodology and the data presented in this thesis. For example, the prototypical data for the proportional length of the coda in a completion of B/10/1 would identify that the coda should be proportional to between 7% and 22% of the movement. Applying regression analysis to the prototype data collected here would identify that the coda of B/10/1 should be proportional to 19% of the movement. With regard to the proportional length of the coda in Cooper's realisation, the section is proportional to 23% of the movement. This is not only larger than the proportion predicted using regression analysis, but is also outside the prototypical constraints.

8.6 Assessing the Achievement of the Research Aims

In order to measure the success of this research project, this section examines the research aims proposed in Section 1.4.1 (p. 49). These are listed below. Beside each of them, a comment is provided that identifies to what extent they have been addressed:

- *to provide a theoretical model that describes the organisation of the coda both as an autonomous entity and as a part of a larger form* – Achieved: the thesis identifies a methodology for identifying the coda in sonata-form (Chapter Three), discusses the varying methods of movement closure and recapitulation-coda parataxis (Chapter Four), and analyses composer-specific sonata-form codas investigating how the coda is organised (Chapters Five, Six and Seven). These analyses are employed as a basis for providing a new and extended definition of the coda (Section 8.3.1, p. 371).
- *to develop an approach able to engage with large samples of musical material in order to draw observations and conclusions relevant to the whole sample rather than isolated examples* – Achieved: the thesis incorporates a number of classification and statistical methodologies which allows engagement with all first- and final-movements in symphonies by Haydn, Mozart and Beethoven. As stated in Section 8.5 (p. 376), all of these processes, with some minor alteration, could be used to explore the coda and other structural sections in samples beyond this thesis. The creation of the eight criteria permits the identification and analysis of all the codas in the sample. This thesis is not restricted by the same constraints as Kerman's (1982) and Cavett-Dunsby's (1988) studies (Section 1.2.2, p. 40). The eight criteria also allow for the classification of the entire sample with regard to the varying closing operations, whilst also categorising movements which contain a coda based on the different recapitulation-coda parataxes. By using an approach which identifies prototypes and the most- and least-prototypical examples, it is possible systematically to identify an average for each parameter inves-

tigated and compare every coda against this value. Identifying the most- and least-prototypical examples allows for us to gain a better understanding of how the coda is organised and how it functions. Finally, by adopting the SRCT (Section 2.6, p. 87), the thesis was able to engage with the entire sample, identifying how the organisation of the coda changes over time.

8.7 Final Thoughts

The study of sonata form in the symphonies by Haydn, Mozart and Beethoven is not unfamiliar in music research. However, the investigation of how these composers organise the coda in their sonata-form movements has, until now, been neglected. The ultimate goal of this thesis was to provide a new perspective on the coda, to establish a methodology for identifying the presence and start of a coda, and to adopt an approach which engages with every coda in the selected sample. Now this has been undertaken, future research can investigate the coda in genres and works beyond the thesis sample and focus more on investigating the expressive purposes behind the codas in the movements studied here, with special attention to those movements whose codas do not conform to the prototypes. Understanding the functions of the coda in the works of Haydn, Mozart and Beethoven is crucial not only for our appreciation of those works, but also for our understanding of symphonic music, and other forms and genres, of the late-eighteenth and nineteenth centuries. This thesis may have explored the closing section of sonata form movements, but the methodology and findings presented, are just the beginnings of a much larger study.

Appendix

The following section contains the data used in the statistical calculations. Given the size of the data collected, it is separated into three sections: Haydn Data, Mozart Data and Beethoven Data.

A.1 Haydn Data

A.1.1 Structural Proportions Data

Work/ Movement	Length of Introduction (%)	Length of Exposition (%)	Length of Development (%)	Length of Recapitulation (%)	Length of Coda (bars)	Length of Coda (%)
4/3		41	19	29	13	10
107/3		38	23	34	7	5
13/4		36	25	24	26	15
17/3		37	13	22	26	28
18/3		34	44	16	10	6
23/4		36	24	30	10	10
25/3		41	18	33	10	9
34/4		26	37	26	12	11
43/4		35	25	29	42	12
44/1		39	25	22	22	14
44/4		40	24	25	22	12
46/4		33	11	27	62	29
52/4		38	15	29	33	18
53/4a		27	41	14	36	18
54/1	4	29	30	30	18	8
56/1		36	24	31	24	9
58/1		34	31	28	10	7
59/4		38	17	31	21	14
67/1		34	28	32	16	6
69/1		38	36	17	18	10
71/4		34	25	37	8	5
73/1	9	32	26	22	14	10
75/1	8	30	35	9	28	19
76/4		37	24	25	21	13
77/1		34	24	24	41	19

Work/ Movement	Length of Introduction (%)	Length of Exposition (%)	Length of Development (%)	Length of Recapitulation (%)	Length of Coda (bars)	Length of Coda (%)
77/4		50	16	23	22	11
81/1		37	31	19	22	12
82/1		39	27	25	23	9
82/4		41	23	20	45	16
83/4		34	21	24	20	20
84/4		32	36	19	37	13
86/1	5	32	32	13	37	18
86/4		55	14	14	43	17
87/4		39	19	33	22	10
88/1	3	34	29	26	20	8
88/4		55	20	14	27	11
89/1		34	30	21	26	15
90/1	4	37	25	24	22	10
90/4		32	26	12	70	29
91/1	4	38	28	21	24	9
91/4		36	26	24	32	14
92/1	5	28	19	34	33	15
92/4		33	32	23	44	13
93/1	6	52	21	16	26	7
94/4		41	26	16	43	16
95/4		45	11	31	31	13
96/1	4	34	36	15	21	11
97/1	3	49	15	19	54	14
97/4		45	19	13	88	23
98/1	3	53	18	16	42	10
98/4		55	16	18	59	11
99/1	7	52	18	19	12	4
99/4		49	18	27	15	5
100/4		43	26	21	38	10
101/1	5	45	21	21	33	7
101/4		53	17	20	31	10
102/1	6	44	29	9	51	13
102/4		30	17	38	52	15
103/1	14	38	23	15	28	10
103/4a	1	44	21	22	50	13
103/4b	1	46	21	22	37	10
104/1	4	53	17	18	29	7
104/4		53	17	15	70	15

A.1.2 Harmonic Data

Work/ Movement	Proportion (%)																				Chord Diversity (no. of chords)	Rate of Harmonic Change (no. of chords per bar)	Harmonic Gradient
	I	i	ii	iii/III	iv	IV	V	vi	bVI	VI	V/ii	V/iii	V/IV	V/V	V/vi	V/vii	Dim7	N	Aug.	Silence			
4/3	68		18			4	10														4	0.92	-0.0268
107/3	75		7			11	7														4	2.00	0.0659
13/4	37		4			10	27	12					2	10							7	1.12	-0.0488
17/3	35	10	4			12	40														5	0.69	-0.0818
18/3	66		6				26														3	1.20	-0.0044
23/4	80																			20	2	0.00	0
25/3	70		5			10	15														4	0.60	-0.0545
34/4	46					4	42	8													4	0.83	0.0549
43/4	31		5			17	25	3					4	1			10			5	9	1.07	-0.0084
44/1		34	7	5	14	4	16						9				11				11	1.59	-0.0518
44/4		30	18		9		34			9											5	1.00	-0.0403
46/4	31		13	2		6	25	6						3			5			8	9	1.31	-0.0015
52/4		39	11		17		21			3							6			3	7	1.03	-0.0009
53/4a	36		4			4	35	6						6			10				7	1.17	-0.0199
54/1	50		6				39												6		4	1.00	-0.0691
56/1	66		2				26	1						4							5	0.79	-0.0024
58/1	20		10			10	10						50								5	0.40	-0.2061
59/4	54		16				30														3	1.33	0.0212
67/1	69					13	19														3	0.63	-0.0466
69/1	46		10			11	22	11													5	1.72	-0.0008

Work/ Movement	Proportion (%)																				Chord Diversity (no. of chords)	Rate of Harmonic Change (no. of chords per bar)	Harmonic Gradient
	I	i	ii	iii/III	iv	IV	V	vi	bVI	VI	V/ii	V/iii	V/IV	V/V	V/vi	V/vii	Dim7	N	Aug.	Silence			
71/4	56		6			25	6	6													5	2.00	-0.0041
73/1	38		2			7	27	2	4				4	7			7	4			12	1.79	-0.1363
75/1	36		11			5	32	15					1								6	1.61	-0.0204
76/4	49		4			14	23	10													5	2.00	-0.0143
77/1	45		2			13	29	4					4				2				8	1.56	-0.0151
77/4	39		9			2	36	5									9				6	1.18	-0.0743
81/1	47		5	1		6	27	3					9				1				8	1.41	-0.0577
82/1	67	7			7		9		2				2	4					2		8	0.74	-0.1097
82/4	51	1	8		2	1	23	2						4			7				10	1.02	-0.04
83/4	50		4		1	8	26						4	3			5				8	2.00	0.0015
84/4	45		3			5	36	5									5				6	1.43	-0.0186
86/1	47		5			12	24	1			3		5	3							8	1.78	-0.0035
86/4	46					8	18	3	9				5	2					9		8	0.93	-0.0769
87/4	55		9			9	14	5					5							5	7	0.64	-0.0238
88/1	53		2			8	33													5	5	1.05	-0.0096
88/4	52		4			11	24	6					4								6	1.41	-0.0307
89/1	35		9			6	29	2			5		5	1			8				10	1.58	0.003
90/1	39		6			6	45	5													5	1.45	-0.0184
90/4	23	3	4	2		5	30	1			8	1	2	1	1	1	10	7			19	1.03	-0.0403
91/1	51		10			11	28														4	1.17	-0.0174
91/4	41		6			8	36						6	3							6	1.50	-0.0099
92/1	24		20		3	3	26	6	3				3	3	6		3				11	0.73	-0.0441

Work/ Movement	Proportion (%)																				Chord Diversity (no. of chords)	Rate of Harmonic Change (no. of chords per bar)	Harmonic Gradient
	I	i	ii	iii/III	iv	IV	V	vi	bVI	VI	V/ii	V/iii	V/IV	V/V	V/vi	V/vii	Dim7	N	Aug.	Silence			
92/4	45		3	1		7	33	3									7				8	1.25	-0.0462
93/1	51		1		4	14	23	1									5				7	1.19	-0.019
94/4	52	2	2			6	21	2	5					2	2		5				10	0.81	-0.0285
95/4	48		2			10	29	2					2	5			3				8	1.26	-0.0261
96/1	42	6	13			7	30		1								1				7	1.52	-0.0142
97/1	32		6	4	3	4	18	2	6		3	2	5		2	2	10	2			16	1.17	-0.0626
97/4	39		4		2	7	33	3	2				4	5			1				10	0.88	-0.0167
98/1	36		2			7	48	2					2	2							7	1.07	-0.0193
98/4	52		6			4	31	1			5									2	7	0.92	-0.0017
99/1	54					25	21														3	1.25	-0.0456
99/4	40					13	27						20								4	1.27	-0.0751
100/4	53		1			6	39	1													5	0.82	-0.0181
101/1	35		6				47							12							4	0.79	-0.0252
101/4	42		8			11	27	2					10								6	1.52	-0.0271
102/1	31		5			3	27	3			3	4			7		13			4	12	1.37	-0.0284
102/4	54				4	2	15	8									12		4	2	8	0.58	-0.0001
103/1	34		14			9	23	13					4	4							7	1.14	-0.0101
103/4a	34					4	18		14				1				24		1	4	8	0.70	-0.0567
103/4b	46					5	24						1				22		1		6	0.92	-0.0824
104/1	61		12			3	17										7				5	1.24	-0.0268
104/4	34	3	5		1	12	30	1	4				2	8							10	0.99	-0.0097

A.1.3 Thematic Data

Work/ Movement	Proportions (%)											Thematic Diversity (no. of different themes)
	Introduction Material (IM)	Expositional First Subject (EFS)	Expositional Transition Material (ETM)	Expositional Second Subject (ESS)	Expositional Closing Material (ECM)	Development Material (DM)	Cadential Material (CM)	Tonic Material (TM)	Link Material (LM)	Silence	Repeated Bars	
4/3		69						31				3
107/3		43					57					2
13/4		27			38	12	19	4				5
17/3				15	38		15	8	23			5
18/3							90	10				2
23/4					40			40		20		4
25/3		40			40			20				3
34/4						17	75	8				3
43/4		29			36		19	5	7	5		7
44/1		27		9	64							4
44/4		41					55					3
46/4		31					5		10	8	47	6
52/4				58			36	3		3		4
53/4a		22			11		42	3	22			5
54/1		67					28	6				3
56/1					58		17	25				4
58/1				60			30	10				3
59/4		86					14					3
67/1		100										1
69/1		44	33		11			11				4

Work/ Movement	Proportions ()											Thematic Diversi-ty (no. of repeated themes)
	Introduction Material (IM)	Expositional First Subject (EFS)	Expositional Transition Material (ETM)	Expositional Second Sub-ject (ESS)	Expositional Closing Material (ECM)	Development Material (DM)	Cadential Material (CM)	Tonic Material (TM)	Link Material (LM)	Silence	Repeated Bars	
71/4							38	63				2
73/1					71		21	7				4
75/1		64			11		21	4				5
76/4		14			62		24					4
77/1				54	32		15					3
77/4		54					35		12			3
81/1		55	18					5	23			4
82/1		30			30		9	30				4
82/4		22			39	23		16				4
83/4		30			20		25	25				5
84/4		24			54		16	5				4
86/1			16	32			49	3				5
86/4		30		9	33		7	21				6
87/4		36					41	18		5		4
88/1		25			30		35	5		5		5
88/4		13		38			44	6				5
89/1		35	23		15		15	12				5
90/1		55					45					2
90/4		41		3	34	3	20					6
91/1		8			38	8	38	8				6
91/4		41			34		22	3				5
92/1		36		18	9		15	6	15			6

Work/ Movement	Proportions ()											Thematic Diversity (no. of repeated themes)
	Introduction Material (IM)	Expositional First Subject (EFS)	Expositional Transition Material (ETM)	Expositional Second Subject (ESS)	Expositional Closing Material (ECM)	Development Material (DM)	Cadential Material (CM)	Tonic Material (TM)	Link Material (LM)	Silence	Repeated Bars	
92/4		57					39	5				4
93/1					38		38	23				4
94/4		37					37	26				4
95/4		13					45	26	16			4
96/1	14	43	10				33					5
97/1		13	15		52		7	13				5
97/4		38		20	3		24	15				6
98/1		62					29	10				3
98/4		29					50	9	9	3		6
99/1		58					33	8				3
99/4							87	13				2
100/4		79					11	11				4
101/1		27				27	39	6				4
101/4		35					58	6				3
102/1		24			41		29	2		4		6
102/4		42					44	12		2		4
103/1	29	16			24	23	5	2				8
103/4a		62					18	16		4		4
103/4b		51					27	22				3
104/1		14			38		34	14				5
104/4		43	20		13	9	7	9				6

A.1.4 Orchestration and Instrumentation Data

Work/ Movement	Total Orchestration in Coda (%)	Orchestration Gradient	Deployment (%)													
			Flute	Oboe	Clarinet	Bassoon	Horn	Trumpet	Timpano	First Violin	Second Violin	Viola	Cello	Double Bass	Keyboard	Percussion
4/3	93	0.022		100		92	77			100	100	92	92	92		
107/3	86	0		100		86	86			100	100	86	86	86		
13/4	78	0.0244	73	54		88	62		35	100	100	92	88	88		
17/3	90	0.0055		69		100	50			100	100	100	100	100		
18/3	100	0		100		100	100			100	100	100	100	100		
23/4	55	0.0363				70				80	80	70	70	70		
25/3	83	0.0667		90		80	50			100	100	80	80	80		
34/4	97	-0.0039		100		100	75			100	100	100	100	100		
43/4	66	0.0119		40		69	40			95	81	69	69	69		
44/1	90	0.0109		64		100	73			95	91	100	100	100		
44/4	86	0.0169		59		100	59			100	100	100	100	100		
46/4	71	-0.0009		48		73	52			90	82	74	73	73		
52/4	78	0.0119		39		39	58			97	97	97	97	97		
53/4a	69	0.0163	44	39		64	39		31	100	100	81	97	97		
54/1	52	0.0295	39	33		33	39	33	33	100	100	89	33	33		
56/1	91	0.0179		100		96	79	83	83	100	96	83	96	96		
58/1	91	0.0053		30		100	100			100	100	100	100	100		
59/4	38	0.0162		57		29	76			29	29	29	29	29		
67/1	68	0.0127		56		56	56			75	75	75	75	75		
69/1	89	0.0164		94		100	67	67	67	100	100	100	100	100		
71/4	100	0	100	100		100	100			100	100	100	100	100		

Work/ Movement	Total Orchestration in Coda (%)	Orchestration Gradient	Deployment (%)													
			Flute	Oboe	Clarinet	Bassoon	Horn	Trumpet	Timpano	First Violin	Second Violin	Viola	Cello	Double Bass	Keyboard	Percussion
73/1	94	0.021	100	79		86	79			100	100	100	100	100		
75/1	67	0.0308	46	50		46	61	39	39	100	96	96	82	82		
76/4	81	0.0294	86	86		76	86			90	90	71	71	71		
77/1	88	0.0078	73	73		78	68			100	100	100	100	100		
77/4	80	0.0082	68	77		77	77			82	82	86	86	86		
81/1	90	0.0036	100	82		91	77			91	100	95	95	95		
82/1	61	0.0362	61	70		61	61		61	100	100	87	83	83		
82/4	82	0.0126	69	82		69	56		56	98	98	98	98	98		
83/4	78	0.0265	65	70		65	50			100	95	90	85	85		
84/4	89	0.0136	76	76		78	81			100	97	97	97	97		
86/1	75	0.0106	65	73		73	54	43	43	100	100	92	92	92		
86/4	92	-0.0011	91	91		91	88	86	86	95	95	98	98	98		
87/4	78	0.0294	59	59		59	50			95	95	95	95	95		
88/1	91	0.007	85	85		85	85			95	95	95	95	95		
88/4	91	0.009	100	100		100	63	70	70	100	100	100	100	100		
89/1	76	0.0149	54	62		69	65			100	100	88	73	73		
90/1	74	-0.0117	59	59		91	64	41	41	91	91	91	91	91		
90/4	63	0.0087	53	67		66	37	26	26	93	81	81	81	81		
91/1	74	0.0394	67	67		71	50			100	96	71	71	71		
91/4	77	0.0115	47	75		56	75			97	97	75	84	84		
92/1	80	0.0133	64	67		76	61	58	58	100	100	100	100	100		
92/4	65	0.0109	95	73		57	52	48	41	80	70	68	68	68		
93/1	97	0.0025	100	100		100	88	88	88	100	100	100	100	100		

Work/ Movement	Total Orchestration in Coda (%)	Orchestration Gradient	Deployment (%)													
			Flute	Oboe	Clarinet	Bassoon	Horn	Trumpet	Timpano	First Violin	Second Violin	Viola	Cello	Double Bass	Keyboard	Percussion
94/4	80	0.0084	91	91		91	74	56	77	91	88	74	72	72		
95/4	80	0.0238	81	84		84	68	68	68	97	90	90	77	77		
96/1	86	0.0209	86	100		86	81	81	71	100	100	86	76	76		
97/1	64	0.0168	48	56		59	33	33	33	98	100	93	85	70		
97/4	42	0.0041	67	71		69	52	52	49	93	80	78	78	78		
98/1	83	0.011	74	76		69	71	67	67	100	98	98	95	95		
98/4	77	0	64	64		66	64	76	76	98	97	97	97	97	22	
99/1	94	0	100	100	83	100	83	83	83	100	100	100	100	100		
99/4	100	0	100	100	100	100	100	100	100	100	100	100	100	100		
100/4	61	0.028	63	61		47	58	45	50	87	79	79	79	79		45
101/1	65	0.0279	61	67	58	73	52	45	45	88	76	76	70	70		
101/4	79	0.026	65	65	65	65	65	65	61	100	100	100	100	100		
102/1	70	0.0063	78	63		57	47	47	45	96	96	96	75	73		
102/4	64	0.0179	63	63		63	48	48	42	90	75	75	75	75		
103/1	71	0.0296	61	64	64	93	64	50	50	64	64	93	93	93		
103/4a	53	0.014	48	52	52	50	48	48	48	94	94	92	84	84		
103/4b	81	0.0204	70	70	70	73	70	70	70	97	97	97	92	92		
104/1	74	0.0204	69	66	66	79	59	41	41	97	100	100	83	83		
104/4	57	0.0057	93	76	66	83	61	61	59	84	84	84	84	84		

A.2 Mozart Data

A.2.1 Structural Proportions Data

Work/ Movement	Length of Introduction (%)	Length of Exposition (%)	Length of Development (%)	Length of Recapitulation (%)	Length of Coda (bars)	Length of Coda (%)
133/1		43	26	24	14	8
134/1		39	16	35	18	10
134/4		42	12	42	11	4
161/3		32	21	37	15	9
184/3		28	24	33	34	14
199/3		36	14	43	41	7
181/3		34	14	34	30	18
182/1		33	18	38	28	11
183/1		40	16	41	14	3
183/4		40	16	42	8	2
201/1		39	15	40	22	6
201/4		35	23	37	21	6
202/1		38	16	41	10	5
202/4		37	22	37	14	3
200/1		40	14	41	20	6
200/4		39	21	34	19	5
121/3		34	20	34	28	13
250/1	12	30	19	30	26	9
250/4	2	43	17	36	22	2
297/1		40	15	25	58	20
320/1	2	37	21	32	22	8
320/3		29	30	25	49	16
338/1		43	17	30	28	11
338/3		44	14	32	28	9
385/4		34	18	29	49	19
425/1	5	53	10	26	23	6
425/4		39	16	32	49	12
543/1	6	55	10	25	18	4
543/4		39	18	30	34	13
550/1		50	16	28	24	6
550/4		40	26	26	24	8
551/4		40	17	35	68	9

A.2.2 Harmonic Data

Work/ Movement	Proportion (%)																	Chord Diversity (no. of chords)	Rate of Harmonic Change (no. of chords per bar)	Harmonic Gradient
	I	i	ii	iii	iv	IV	V	vi	VI	V/ii	V/IV	V/V	V/vi	Dim7	N	Aug.	Silence			
133/1	70		11				18											3	0.86	-0.0211
134/1	67					11	11	11										4	0.33	-0.1754
134/4	82					9	9											3	0.45	-0.1374
161/3	91		5				5											3	0.53	-0.0351
184/3	68		9				22							1				4	0.76	-0.0093
199/3	51		10			2	18	7		2	7			1				8	0.59	-0.0186
181/3	85		3				12											3	0.43	-0.0057
182/1	61					7	25	5										4	0.96	0.0409
183/1		54	7		7		7		11					14				6	0.79	-0.1618
183/4		31	6		13		19		6					25				6	1.00	-0.2
201/1	40		20	3		3	19	3			9			1				8	1.36	-0.0023
201/4	67		2			7	10							15				5	0.76	-0.1008
202/1	43		7				40	10										4	1.50	-0.0176
202/4	71					14	14											3	0.86	0.0987
200/1	68		16			7	9											4	0.86	-0.0107
200/4	55		11				32							3				4	1.89	-0.0339
121/3	54		2			9	18	7				7					4	6	0.54	-0.0701
250/1	63		6	2		4	10	2				4					8	7	0.58	-0.0093
250/4	32					18	50											3	0.68	0.0186
297/1	49		8		3	11	23	3			3							7	1.43	-0.0107

Work/ Movement	Proportion (%)																	Chord Diversity (no. of chords)	Rate of Harmonic Change (no. of chords per bar)	Harmonic Gradient
	I	i	ii	iii	iv	IV	V	vi	VI	V/ii	V/IV	V/V	V/vi	Dim7	N	Aug.	Silence			
320/1	63		7	2		2	19	5						2				7	1.09	-0.1028
320/3	54		1			16	16	6		2	2		2					8	1.22	-0.026
338/1	67		4		7	7	13	2										6	0.82	-0.027
338/3	41		11			5	23	4		2			4	11				8	0.82	-0.0862
385/4	43		4			11	26	4		1	2	2	2	4		3		11	1.14	-0.0424
425/1	54		22				15				7			2				5	0.83	-0.0458
425/4	45		18			11	22	3										5	1.00	-0.011
543/1	63		9			3	16	2				2	3	3				8	1.17	-0.0581
543/4	47		12			6	16	6		3	1		1	4			3	10	1.06	-0.0045
550/1	1	50			10	1	24				1	6			5			8	1.38	-0.0221
550/4		44	4		8		31		4		8							6	1.58	0.0197
551/4	33	1	9		1	6	18	13			7	6	3	4				11	0.94	-0.0304

A.2.3 Thematic Data

Work/ Movement	Proportions (%)											Thematic Diversity (no. of different themes)
	Introduction Material (IM)	Expositional First Subject (EFS)	Expositional Transition Material (ETM)	Expositional Second Subject (ESS)	Expositional Closing Material (ECM)	Development Material (DM)	Cadential Material (CM)	Tonic Material (TM)	Link Material (LM)	Silence	Repeated Bars	
133/1		57			43							2
134/1		33						67				2
134/4		36					27	36				3
161/3							27	73			27	2
184/3		68					12	21			41	3
199/3		17		21	46	17					40	4
181/3		53					13	33				4
182/1		25				38	31	6				4
183/1		71						29				3
183/4						25	50		25			3
201/1		36				9	32	5	18			5
201/4		14	29		29		29					4
202/1						60	40					2
202/4		36				64						2
200/1		43					36	21			10	3
200/4		95						5			32	3
121/3		29		29	39					4	43	4
250/1	27	27					15	23		8		6
250/4		53			31		13			3	38	4

Work/ Movement	Proportions (%)											Thematic Diversity (no. of different themes)
	Introduction Material (IM)	Expositional First Subject (EFS)	Expositional Transition Material (ETM)	Expositional Second Subject (ESS)	Expositional Closing Material (ECM)	Development Material (DM)	Cadential Material (CM)	Tonic Material (TM)	Link Material (LM)	Silence	Repeated Bars	
297/1		7			48		24	21			36	4
320/1					45	32	9	14			9	4
320/3		59			8		14	18			37	4
338/1		36			14		7	43			7	5
338/3		29			29	14	14	14				5
385/4		27					24	16	33		4	4
425/1		22			17	52		9			30	5
425/4		20			76			4			24	3
543/1			22		50			28				4
543/4					82		6	9		3		4
550/1		33		17	38			13				4
550/4					63		38				42	2
551/4		70		23				7			4	3

A.2.4 Orchestration and Instrumentation Data

Work/ Movement	Total Orchestration in Coda (%)	Orchestration Gradient	Deployment (%)											
			Flute	Oboe	Clarinet	Bassoon	Horn	Trumpet	Timpano	First Violin	Second Violin	Viola	Cello	Double Bass
133/1	100	0		100			100	100		100	100	100	100	100
134/1	85	0.0217	39				56			100	100	100	100	100
134/4	100	0	100				100			100	100	100	100	100
161/3	100	0	100	100			100	100	100	100	100	100	100	100
184/3	76	0.018	71	68		68	71	65		100	100	91	65	65
199/3	80	0.019	59				59			100	98	83	83	83
181/3	83	0.0245		73			73	73		100	100	100	73	73
182/1	75	0.0284		63			63			100	100	81	69	69
183/1	91	0.0269		79		93	79			100	100	93	93	93
183/4	89	0.0402		63		100	50			100	100	100	100	100
201/1	89	0.0143		82			73			100	100	86	91	91
201/4	84	-0.0115		90			67			90	100	90	76	76
202/1	83	0.0515		60			60	40		100	100	100	100	100
202/4	73	-0.0379		71			100	36		100	100	100	36	43
200/1	50	0.039		40			40	40		70	60	50	50	50
200/4	66	0.034		37			47	37		100	100	63	74	74
121/3	83	0.0085		75			75			96	96	96	71	71
250/1	73	0.0259		88		73	77	62	50	73	92	73	73	73
250/4	43	0.0154		41		28	53	28	28	69	69	53	28	28

Work/ Movement	Total Orchestration in Coda (%)	Orchestration Gradient	Deployment (%)											
			Flute	Oboe	Clarinet	Bassoon	Horn	Trumpet	Timpano	First Violin	Second Violin	Viola	Cello	Double Bass
297/1	79	0.0096	71	69	72	83	72	57	55	100	100	100	83	83
320/1	97	-0.0003		100		100	100	100	68	100	100	100	100	100
320/3	70	0.0007		100		98	94	84	80	100	100	100	98	98
338/1	94	0.0057		82		100	89	82	82	100	100	100	100	100
338/3	85	0.0138		79		100	82	50	50	100	100	96	96	96
385/4	69	0.0149	43	43	43	73	43	43	41	100	100	98	98	98
425/1	72	0.0372		70		78	52	52	52	100	83	78	78	78
425/4	91	0.0063		92		98	74	68	66	98	98	100	100	100
543/1	91	0.0153	94		94	100	72	72	72	100	100	100	100	100
543/4	79	0.0149	76		79	71	79	38	38	97	97	97	97	97
550/1a	90	0.0019	88	88		88	88			92	100	83	92	92
550/1b	88	0.001	88	67	88	88	88			92	100	83	92	92
550/4a	88	0.0229	79	79		79	71			100	96	96	96	96
550/4b	87	0.0247	79	79	79	79	71			100	96	96	96	96
551/4	75	0.0086	76	81		71	62	51	50	87	93	93	94	63

A.3 Beethoven Data

A.3.1 Structural Proportions Data

Work/ Movement	Length of Introduction (%)	Length of Exposition (%)	Length of Development (%)	Length of Recapitulation (%)	Length of Coda (bars)	Length of Coda (%)
1/1	4	49	17	21	40	10
1/4	1	46	18	19	67	17
2/1	7	43	18	19	57	12
2/4		26	16	25	149	34
3/1		36	29	19	135	16
4/1	6	46	23	18	48	7
4/4		44	18	20	78	17
5/1		40	20	20	129	21
5/4		32	23	16	151	29
6/1		42	22	21	95	15
6/5		30	14	23	88	33
7/1	11	40	17	20	62	11
7/4		40	19	21	125	20
8/1		43	18	23	73	15
8/4		18	13	22	236	47
9/1		29	25	23	121	22

A.3.2 Harmonic Data

Work/ Movement	Proportion (%)																						Chord Diversity (no. of chords)	Rate of Harmonic Change (no. of chords per bar)	Harmonic Gradient
	I	bI	i	ii	iii/III	iv	IV	v	V	vi	bVI	VI	V/ii	V/iii	V/IV	V/V	V/vi	V/vii	Dim7	N	Aug	Silence	Harmonic Aberration			
1/1	63			5			6		6	10					5				3			3		8	0.50	-0.0689
1/4	57			10					29							1						1		5	0.67	-0.0057
2/1	34			9	2		6	2	20	1			4		9		2		9	1				13	0.89	-0.0315
2/4	31		1	3	1	4	11		22	4			3		7	1	3		5			1		16	1.05	-0.0094
3/1	23		3	8	3		2		32	2		7	2		1	1			16					14	0.49	-0.027
4/1	65								35															2	0.29	-0.0049
4/4	29			7	2	2	1		37	6			1	1	1	6			6			3		14	0.72	-0.01
5/1	4		30	2	2	14			28			2			1	1		1	9	4		1		14	0.91	-0.023
5/4	50		1	1		5	4		27						6	1			2			3		10	0.87	-0.0073
6/1	46			1			14		26	4					6	2								7	0.68	-0.0161
6/5	32			5			5		36	5			6		2	10								8	0.61	-0.0096
7/1	44	8		2	3		6		27	2		3				3						2		10	0.82	-0.0316
7/4	27		2	4	2	1	4		37			3		2	10					3		2		12	0.67	-0.0209
8/1	46		1	3			2		18		10				1		3	3	10		2	3		13	0.70	-0.0432
8/4	31		1	3	5	1	9	2	20	4	1	2	1	1	5	3	2		4				5	21	1.05	-0.0107
9/1	2		32	4	1	3	3		18			2	1	3	7	1			21	1	1			16	1.17	-0.0161

A.3.3 Thematic Data

Work/ Movement	Proportions (%)											Thematic Diversity (no. of different themes)
	Introduction Material (IM)	Expositional First Subject (EFS)	Expositional Transition Material (ETM)	Expositional Second Subject (ESS)	Expositional Closing Material (ECM)	Development Material (DM)	Cadential Material (CM)	Tonic Material (TM)	Link Material (LM)	Silence	Repeated Bars	
1/1		30					18	50		3		3
1/4	7	36					39	16		1		4
2/1		28				11	26	9	26			5
2/4		71				3	20	5		1		5
3/1		36		18		33	14					4
4/1		42			25		17	17				4
4/4		27		10	9	26	26			3		5
5/1		33		50			16			1		3
5/4		7	20	9	11		31	19		3		6
6/1		29			38	4	24	4				5
6/5		55	13		20		7	6				5
7/1		76			10	8	3		2	2		5
7/4		35	51				10	2		2		4
8/1		33			32		15	18		3		4
8/4		51		8	3	18	5	15				6
9/1		69		17	4		6	3				5

A.3.4 Orchestration and Instrumentation Data

Work/ Movement	Total Orchestration in Coda (%)	Orchestration Gradient	Deployment (%)														
			Piccolo	Flute	Oboe	Clarinet	Bassoon	Contra-Bassoon	Horn	Trumpet	Trombone	Timpano	First Violin	Second Violin	Viola	Cello	Double Bass
1/1	85	0.0118		95	98	88	98		78	68		68	95	95	78	80	80
1/4	70	0.0107		81	57	63	79		66	40		39	94	85	79	79	76
2/1	85	0.0062		82	95	72	84		82	70		68	91	95	95	93	93
2/4	77	0.0017		71	80	48	82		68	43		42	97	97	99	99	96
3/1	75	0.003		59	73	72	71		76	36		37	99	99	86	96	92
4/1	87	0.0056		90	83	83	81		83	83		77	96	96	100	85	85
4/4	63	0.0029		63	54	64	59		54	38		41	91	74	81	76	55
5/1	77	0		78	78	84	91		67	67		64	84	84	81	80	69
5/4	80	0.0023	60	84	84	79	83	82	88	73	39	73	93	89	92	91	88
6/1	72	-0.0019		46	58	73	74		56				89	77	79	85	85
6/5	69	0.0023		67	72	65	89		63	31	24		76	85	83	97	74
7/1	82	0.0102		92	60	90	92		82	58		58	89	89	82	98	98
7/4	86	0.003		89	95	78	92		73	78		66	86	88	90	98	98
8/1	72	0.0043		81	74	81	85		70	51		62	75	84	82	58	60
8/4	75	0.0017		81	72	77	83		72	52		39	90	90	82	80	76
9/1	85	0.0009		68	89	74	83		93	71		71	90	90	98	97	97

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